

AUGUST, 1929

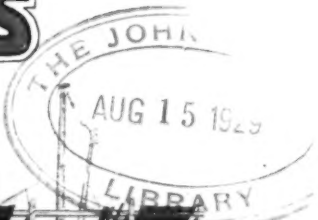
25 Cents, \$1 a Year

# Contractors and Engineers Monthly

The World's Tallest  
Building Shown Un-  
der Construction

See page 80


Photo by Keystone



CORPORATION BANK  
TRUST COMPANY

# TRENCHMARINE

## Portable Pumps

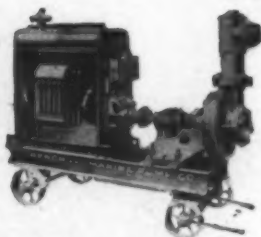


**"TRENCHMARINE"**  
Midget Portable Pumps

Size 1½ weighs 85 lbs., \$100  
Size 2 weighs 160 lbs., \$160

**DIRTY WATER  
CANNOT CLOG  
THESE PUMPS**

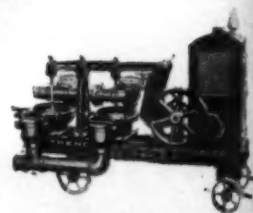
## Pumps That Pump



**"Trenchmarine" Heavy  
Duty Centrifugal Pump**  
—Sizes 2½ inch to 10  
inch inclusive.

There is a "Trenchmarine" pump for every purpose—priced reasonably—and built for long, hard service. Ask your supply house for information about "Trenchmarine" Diaphragm and Centrifugal pumping outfits, or write directly to us.

*Distributors Inquiries Invited*



**"Trenchmarine" Dia-  
phragm Ball Valve Lift  
and Force Pump—Single  
and Double models—  
Sizes 3 inch and 4 inch.**

**TRENCH & MARINE PUMP CO.**  
**126 WEST 22nd STREET NEW YORK, N.Y.**



# Where to Purchase

A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment.

The index of Advertisers faces the inside back cover. When writing to advertisers please mention the CONTRACTORS & ENGINEERS MONTHLY. A star (\*) before the manufacturer's name indicates that his advertisement appears in this issue.

This index is published as an aid to the reader, but the publishers assume no responsibility for errors or omissions.

## AIR COMPRESSORS

\*Allis-Chalmers Mfg. Co., Frankfort, N. Y.  
 \*Buhl Company, Chicago  
 \*Domestic Eng. & Pump Co., Shippensburg, Pa.  
 \*Independent Pn. Tool Co., Chicago, Ill.  
 \*New Engine Co., Lansing, Mich.  
 \*O. K. Clutch & Mach. Co., Columbia, Pa.  
 \*Stover Mfg. & Eng. Co., Freeport, Ill.  
 \*Sullivan Machinery Co., Chicago  
 \*Acme Road Machy. Co., Frankfort, N. Y.  
 \*American Steam Pump Co., Battle Creek, Mich.  
 \*Barnes Mfg. Co., Mansfield, O.  
 \*Cement-Gun Co., Allentown, Pa.  
 \*Chicago Pneumatic Tool Co., N. Y.  
 \*Cook Motor Co., Delaware, O.  
 \*Curtis Pneumatic Machy. Co., St. Louis, Mo.  
 \*De Laval Steam Turbine Co., Trenton, N. J.  
 \*Fairbanks, Morse & Co., Chicago.  
 \*Gardner-Denver Co., Quincy, Ill.  
 \*General Electric Co., Schenectady, N. Y.  
 \*Hardie-Tynes Mfg. Co., Birmingham, Ala.  
 \*Indiana Air Pump Co., Indianapolis, Ind.  
 \*Ingersoll-Rand Co., N. Y.  
 \*Nordberg Mfg. Co., Milwaukee, Wis.  
 \*Norwalk Iron Works Co., So. Norwalk, Conn.  
 \*Schramm, Inc., West Chester, Pa.  
 \*United Iron Works, Kansas City, Mo.  
 \*Westinghouse Traction Brake Co., Wilmerding, Pa.  
 \*Worthington Pump & Machinery Corp., N. Y.

## AIR COMPRESSORS, PORTABLE

\*Buhl Co., Chicago  
 \*Domestic Eng. & Pump Co., Shippensburg, Pa.  
 \*Independent Pn. Tool Co., Chicago  
 \*O. K. Clutch & Mach. Co., Columbia, Pa.  
 \*Sullivan Machinery Co., Chicago  
 \*Cement-Gun Co., Allentown, Pa.  
 \*Chain Belt Co., Milwaukee, Wis.  
 \*Chicago Pneumatic Tool Co., New York  
 \*Curtis Pneumatic Machy. Co., St. Louis, Mo.  
 \*Ingersoll-Rand Co., New York  
 \*Metalweld, Inc., Philadelphia, Pa.  
 \*National Brake & Electric Co., Milwaukee  
 \*Schramm, Inc., West Chester, Pa.  
 \*Simons Paint Spray Brush Co., Dayton, O.

## ARTESIAN WELL DRILLS & PUMPS

\*American Well Works, Aurora, Ill.  
 \*Ingersoll-Rand Co., New York  
 \*Star Drilling Machine Co., Akron, O.

## ASPHALT

\*Barber Asphalt Co., Philadelphia  
 \*Barrett Co., N. Y.  
 \*Standard Oil Co. (Ind.), Chicago  
 \*Standard Oil Co. (N. Y.), N. Y.  
 \*Atlantic Ref. & Asph. Corp., Philadelphia  
 \*Gulf Refining Co., Pittsburg  
 \*Ky. Rock Asph. Co., Louisville, Ky.  
 \*Natural Rk. Asph. Corp., Owensboro, Ky.  
 \*New Orleans Ref. Co., New Orleans  
 \*Pioneer Asph. Co., Lawrenceville, Ill.  
 \*Sinclair Ref. Co., Chicago  
 \*Standard Oil Co. of Cal., S. Francisco  
 \*Standard Oil Co. of La., N. Orleans  
 \*Standard Oil Co. of N. J., Newark  
 \*Texas Co., N. Y.  
 \*Utah Rock Asphalt Corp., Pueblo, Colo.  
 \*Warren Bros. Co., Boston

## ASPHALT BLOCK

\*Hastings Pavement Co., N. Y.

## ASPHALT BRICK

\*Asphalt Brick Co., St. Louis

## ASPHALT CUTTERS

\*Independent Pneumatic Tool Co., Chicago  
 \*Sullivan Machinery Co., Chicago  
 \*Chicago Pneumatic Tool Co., N. Y.  
 \*Cleveland Rock Drill Co., Cleveland, O.  
 \*Dayton Pneum. Tool Co., Dayton, O.  
 \*Gardner-Denver Co., Quincy, Ill.  
 \*Ingersoll-Rand Co., N. Y.

Littleford Bros., Cincinnati.

## ASPHALT KETTLES (See Kettles for Asphalt and Tar Heating)

## ASPHALT PLANTS, TOOLS, ETC.

\*Barber Asphalt Co., Philadelphia  
 \*Chausse Oil Burner Co., Elkhart, Ind.  
 \*Connelly & Company, Philadelphia  
 \*Aeroll Burner Co., West New York, N. J.  
 \*American Fin-Mix Co., Chicago.  
 \*American Fork & Hoe Co., Cleveland, O.  
 \*Charleroi Iron Wks., Charleroi, Pa.  
 \*F. D. Cummer & Son Co., Cleveland, O.  
 \*J. D. Farassy Mfg. Co., Cleveland, O.  
 \*Hetherington & Berner, Indianapolis  
 \*Hauk Mfg. Co., Brooklyn, N. Y.  
 \*Littleford Bros., Cincinnati  
 \*Merriman Asphalt Plant, Inc., Lima, O.  
 \*Warren Bros. Co., Boston

## ASPHALT POURING POTS (See Pots, Asphalt Pouring)

## ASPHALT ROLLERS (See Road Rollers)

## ASPHALT SURFACE HEATERS

\*Barber Asphalt Co., Philadelphia  
 \*Chausse Oil Burner Co., Elkhart, Ind.  
 \*Aeroll Burner Co., West New York, N. J.  
 \*Equitable Asp. Maint. Co., Kan. City, Mo.  
 \*Hauk Mfg. Co., Brooklyn, N. Y.

## BACKROLLERS

\*Baker Mfg. Co., Springfield, Ill.  
 \*Bay City Shovel, Inc., Bay City, Mich.  
 \*Bucyrus-Erie Co., Erie, Pa.  
 \*General Wheelbarrow Co., Cleveland  
 \*Koehring Co., Milwaukee, Wis.  
 \*Osgood Company, Marion, Ohio  
 \*Parsons Co., Newton, Ia.  
 \*Austin Mach. Corp., Muskegon, Mich.  
 \*Buckeye Trac. Ditcher Co., Findlay, O.  
 \*Byers Mach. Co., Ravenna, O.  
 \*Construction Machy. Co., Waterloo, Ia.  
 \*Ersted Mfg. Co., Portland, Ore.  
 \*General Excavator Co., Marion, O.  
 \*Harnischfeger Corp., Milwaukee, Wis.  
 \*LaPlant-Chocate Mfg. Co., Cedar Rapids, Iowa  
 \*Link-Belt Co., Chicago  
 \*Miami Trailer-Scrapper Co., Troy, O.  
 \*Orton Crane & Shovel Co., Chicago  
 \*Star Drilling Mach. Co., Akron, O.  
 \*Speeder Mch. Corp., Cedar Rapids, Iowa  
 \*Waterman Corp., Detroit  
 \*Weller Mfg. Co., Chicago

## BAGS

\*Bates Valve Bag Corp., Chicago

## BAG TRUCKS

\*Bates Valve Bag Corp., Chicago  
 \*Case Crane & Engg. Co., Columbus, O.

## BAE BENDERS AND CUTTERS

\*Koehring Co., Milwaukee, Wis.  
 \*Ransome Conc. Machy. Co., Dunellen, N. J.  
 \*Buffalo Forge Co., Buffalo, N. Y.  
 \*Concrete Steel Co., N. Y.  
 \*Electric Welding Co., Pittsburgh  
 \*D. A. Hinman & Co., Sandwich, Ill.  
 \*J. L. Gleason & Co., Boston, Mass.  
 \*Kardong Bros., Minneapolis  
 \*McKenna Co., Cleveland, O.

## BARRICADE SUPPORTS

\*Cleveland Steel Spec. Corp., Cleveland, O.

## BAE TIES

\*Bates Valve Bag Corp., Chicago  
 \*Symons Clamp & Mfg. Co., Chicago, Ill.

## BATCH BOXES

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Butler Bin Co., Waukesha, Wis.  
 \*Erie Steel Const. Co., Erie, Pa.  
 \*Fairfield Engineering Co., Marion, Ohio  
 \*Heltzel Stl. Form & Ir. Co., Warren, O.  
 \*Jos. Henckert Co., Cincinnati

\*Lakewood Eng. Co., Cleveland, O.  
 \*Easton Car & Const. Co., Easton, Pa.  
 \*Easton Car & Const. Co. of Mo., Kansas O., Mo.  
 \*Koppel Ind. Car & Equip. Co., Keppel, Pa.  
 \*Littleford Bros., Cincinnati  
 \*Jas. B. Seaverns Co., Batavia, Ill.  
 \*Western Wheeled Scraper Co., Aurora, Ill.

## BATCHERS (For Measuring Aggregates)

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Butler Bin Co., Waukesha, Wis.  
 \*Erie Steel Const. Co., Erie, Pa.  
 \*Fairfield Engineering Co., Marion, Ohio  
 \*Heltzel Stl. Form & Ir. Co., Warren, O.  
 \*Superior Engineering Co., Warren, Ohio.

## BEARINGS

\*Fafnir Bearing Co., New Britain, Conn.  
 \*Hyatt Roller Bear. Co., Harrison, N. J.  
 \*New Departure Mfg. Co., Bristol, Conn.  
 \*S. K. F. Industries, New York  
 \*Timken Roller Bearing Co., Canton, O.

## BINS, STORAGE

\*Austin-Western Bd. Mach. Co., Chicago  
 \*Beaumont Mfg. Co., Philadelphia  
 \*Blaw-Knox Co., Pittsburgh, Pa.  
 \*The Burch Corp., Crestline, Ohio  
 \*Butler Bin Co., Waukesha, Wis.  
 \*Erie Steel Const. Co., Erie, Pa.  
 \*Fairfield Engineering Co., Marion, Ohio  
 \*Gardner-Beads Mch. Co., Kennett Sq., Pa.  
 \*Heltzel Stl. Form & Ir. Co., Warren, Ohio  
 \*Industrial Brownhoist Corp., Cleveland, O.  
 \*Ransome Conc. Machy. Co., Dunellen, N. J.  
 \*Austin Mfg. Co., Chicago  
 \*Birmingham Tank Co., Birmingham, Ala.  
 \*Canton Art Metal Co., Canton, Ohio  
 \*Easton Car & Const. Co., Easton, Pa.  
 \*Gallon Iron Works & Mfg. Co., Gallon, Ohio  
 \*C. S. Johnson Co., Champaign, Ill.  
 \*Lancaster Iron Works, Inc., Lancaster, Pa.  
 \*Link-Belt Co., Chicago  
 \*Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.  
 \*Jas. B. Seaverns Co., Batavia, Ill.  
 \*Superior Engineering Co., Warren, Ohio  
 \*Universal Rd. Mach. Co., Kingston, N. Y.  
 \*Weller Mfg. Co., Chicago.

## BLADES FOR GRADERS & SNOW FLOWS

\*Caterpillar Tractor Co., San Leandro, Cal.  
 \*General Wheelbarrow Co., Cleveland  
 \*J. D. Adams & Co., Indianapolis  
 \*Gallon Iron Works & Mfg. Co., Gallon, Ohio  
 \*Shunk Mfg. Co., Bucyrus, Ohio

## BLAST HOLE DRILLING MACHINES (See Well Drilling and Blast Hole Machines)

## BLASTING POWDER (See Explosives)

## BLOCKS AND TACKLE

\*Boston & Lockport Blk. Co., Boston, Mass.  
 \*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
 \*Western Block Co., Lockport, N. Y.

## BLOW TORCHES

\*Chausse Oil Burner Co., Elkhart, Ind.  
 \*O. H. Williams Co., Erie, Pa.  
 \*Everhot Mfg. Co., Maywood, Ill.

## BLUE PRINT MACHINES

\*Paragon Mach. Co., Rochester, N. Y.  
 \*O. F. Pease Co., Chicago  
 \*Wickes Bros., Saginaw, Mich.

## BOILERS

\*Johnston Bros., Inc., Ferrysburg, Mich.  
 \*Chandler & Taylor Co., Indianapolis  
 \*Chatta. Boiler & Tank Co., Chatta., Tenn.  
 \*R. D. Cole Mfg. Co., Newnan, Ga.  
 \*Combustion Eng. Corp., N. Y.  
 \*Erie City Iron Works, Erie, Pa.  
 \*Hartley Blr. Works, Montgomery, Ala.  
 \*Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
 \*Heine Boiler Co., St. Louis, Mo.  
 \*E. Keeler Co., Williamsport, Pa.

For Directory of Local Distributors of Contractors' Equipment, See Pages 131 to 155

# Where to Purchase

## BOILERS, (Continued)

Ladd Water Tube Bldg. Co., Pittsburgh, Pa.  
V. Loeffel & Co., Springfield, Ohio  
Lord & Burnham Co., Irvington, N. Y.  
Murray Iron Works Co., Burlington, Iowa  
Nagle Eng. & Bldg. Works, Erie, Pa.  
New Bern Iron Works & Sup. Co., New Bern, N. C.  
Petroleum Iron Works Co., Sharon, Pa.  
J. S. Schofield's Sons Co., Macon, Ga.  
Stanwood Corp., Cincinnati, Ohio  
Superior Body Corp., Marion, Ind.  
Vogt Mch. Co., Inc., Louisville, Ky.

## BRACES, TRENOH

\*Templeton, Kealy & Co., Chicago  
Jas. H. Shannon Mfg. Co., Chicago  
Duff Mfg. Co., Pittsburgh, Pa.  
Fisher & Hayes Rope & Steel Co., Chicago  
Hawley Mfg. Co., Chicago  
Kalamazoo Fdry. & Mach. Co., Kalamazoo, Mich.  
Waldo Bros. & Bond Co., Boston

## BRANDING TOOLS

Everhot Mfg. Co., Maywood, Ill.

## BRASS GOODS

Glauber Brass, Mfg. Co., Cleveland, Ohio  
Haydenville Co., Haydenville, Mass.  
Hays Mfg. Co., Erie, Pa.  
Mueller Company, Decatur, Ill.  
Union Water Meter Co., Worcester, Mass.  
United-Obendorf Corp., Cleveland, Ohio

## BREAKERS, CONCRETE

\*Independent Pn. Tool Co., Chicago  
\*Sullivan Machy. Co., Chicago  
Chicago Pneumatic Tool Co., N. Y.  
Cleveland Rock Drill Co., Cleveland, Ohio  
Gardner-Denver Co., Quincy, Ill.  
Hardscop Wonder Drill Co., Ottumwa, Iowa  
Ingersoll-Rand Co., New York  
Milwaukee Gas Tool Co., Milwaukee  
Rapid Concrete Breaker Co., Los Angeles, Cal.

## BRICK, PAVING (See Paving Brick)

## BRIDGE FLOORS

\*Armco Culvert Mfrs. Assn., Middletown, O.

## BRIDGES AND BUILDINGS, STEEL

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Frederick Snares Corporation, N. Y.  
American Bridge Co., N. Y.  
Bellevue Bridge Br. & Stl. Co., Bellevue, O.  
Belmont Iron Works, Philadelphia  
Berlin Constr. Co., Berlin, Conn.  
Bethlehem Steel Co., Bethlehem, Pa.  
Boston Bridge Works, Boston  
Butler Mfg. Co., Minneapolis, Minn.  
Central States Br. Co., Indianapolis, Ind.  
Champion Bridge Co., Wilmington, Ohio  
Chesapeake Iron Works, Baltimore, Md.  
Clinton Bridge Works, Clinton, Iowa  
Eastern Bridge & Struc. Co., Worcester, Mass.  
Flour City Orn. Iron Co., Minneapolis  
Fort Pitt Br. Works, Pittsburgh, Pa.  
Hughes-Keenan Co., Mansfield, Ohio  
Ingalls Iron Works Co., Birmingham, Ala.  
Inter. Steel & Iron Co., Evansville, Ind.  
Lakeside Br. & Stl. Co., No. Milwaukee  
Louisville Br. & Iron Co., Louisville, Ky.  
McClintie Marshall Co., Pittsburgh, Pa.  
Milwaukee Br. Co., Milwaukee, Wis.  
Minn. Stl. & Mch. Co., Minneapolis  
Missouri Vy. Br. & Ir. Co., Leavenworth, Kan.  
Mt. Vernon Br. Co., Mt. Vernon, Ohio  
Penn Bridge Co., Beaver Falls, Pa.  
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.  
Richmond Struc. Stl. Co., Richmond, Va.  
Riverside Br. Co., Martins Ferry, Ohio  
Virginia Br. & Ir. Co., Roanoke, Va.  
Wisc. Br. & Ir. Co., No. Milwaukee, Wis.

## BROOMS (See Street Sweeping Brooms)

## BUCKETS, AUTOMATIC DUMPING

\*Lakewood Eng. Co., Cleveland, O.  
\*Union Iron Wks., Inc., Hoboken, N. J.  
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.

## BUCKETS, GLASS SHELL

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Erie Steel Cast. Co., Erie, Pa.  
\*Geo. Hais Mfg. Co., N. Y.  
\*Hayward Co., N. Y.  
\*Industrial Brownhoist Corp., Cleveland  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*G. H. Williams Co., Erie, Pa.  
Buffalo Hat & Der. Co., Buffalo, N. Y.  
Browning Crane Co., Cleveland, Ohio  
F. A. Coleman Co., Cleveland, Ohio  
J. F. Kiesler Co., Chicago  
Link-Belt Co., Chicago  
McMyler Interstate Co., Cleveland, Ohio  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Orion Crane & Shovel Co., Chicago  
Owen Bucket Co., Cleveland, Ohio  
Page Eng. Co., Chicago

## BUCKETS, CONCRETE

\*Insley Mfg. Co., Indianapolis, Ind.  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*Ransome Conc. Mch. Co., Duxellen, N. J.  
\*Union Iron Works, Inc., Hoboken, N. J.  
Norris K. Davis, San Francisco, Calif.  
Koppel Ind. Car & Equip. Co., Koppel, Pa.  
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.

## BUCKETS, DRAGLINE

\*Beaumont Mfg. Co., Philadelphia  
\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
\*Hayward Co., New York  
\*Sauerman Bros., Chicago  
\*Schofield-Burkett Constr. Co., Macon, Ga.  
\*G. H. Williams Co., Erie, Pa.  
Link-Belt Co., Chicago  
Monaghan Mach. Co., Chicago  
Page Eng. Co., Chicago  
Pioneer Bucket Co., Indianapolis, Ind.

## BUCKETS, DREDGING AND EXCAVATING

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Geo. Hais Mfg. Co., N. Y.  
\*Hayward Co., N. Y.  
\*Industrial Brownhoist Corp., Cleveland  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*G. H. Williams Co., Erie, Pa.  
Browning Crane Co., Cleveland  
J. F. Kiesler Co., Chicago  
Link-Belt Co., Chicago  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Orion Crane & Shovel Co., Chicago  
Owen Bucket Co., Cleveland, Ohio

## BUCKETS, ORANGE PEEL

\*Hayward Co., N. Y.  
Industrial Works, Bay City, Mich.  
J. F. Kiesler Co., Chicago  
McMyler Interstate Co., Cleveland, Ohio  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Orion Crane & Shovel Co., Chicago

## BUILDING FORMS (See Forms, Conc.)

## BUILDINGS, STEEL (See Bridges)

## BULLDOZERS

\*Trackson Co., Milwaukee, Wis.  
Miami Trailer-Scraper Co.  
LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa

## BUNKS AND COTS

Ft. Pitt Bedding Co., Pittsburgh, Pa.  
Haggard & Marcusson Co., Chicago  
Southern Rome Co., Baltimore, Md.

## CABLES (See Wire and Cable)

## CABLEWAYS, DRAGLINE

\*Beaumont Mfg. Co., Philadelphia  
\*S. Flory Mfg. Co., Bangor, Pa.  
\*L. P. Green, Chicago  
\*Sauerman Bros., Chicago  
\*Schofield-Burkett Constr. Co., Macon, Ga.  
Link-Belt Co., Chicago  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
Street Bros. Mach. Works, Chattanooga

## CARS FOR MOTOR TRUCKS

Highland Body Mfg. Co., Cincinnati, Ohio  
Weatherproof Body Corp., Corunna, Mich.

## CAISSONS

American Bridge Co., N. Y.  
Biggs Boiler Works, Akron, Ohio  
Birmingham Tank Co., Birmingham, Ala.  
Foundation Co., N. Y.  
Bethlehem Steel Co., Bethlehem, Pa.  
O'Rourke Eng. Constr. Co., N. Y.  
Petroleum Ir. Wks. Co., Sharon, Pa.

## CALCIUM CHLORIDE FOR ROADS

\*Dew Chemical Co., Midland, Mich.  
\*Pittsburgh Plate Glass Co., Barborton, O.  
\*Solvay Sales Corp., New York

## CANS FOR GARBAGE AND REFUSE

American Can Co., N. Y.  
Economy Baler Co., Ann Arbor, Mich.  
Rochester Can Co., Rochester, N. Y.  
Solar-Sturges Mfg. Co., Melrose Pk., Ill.  
Witt Cornice Co., Cincinnati, Ohio

## CAR UNLOADERS (See Loaders)

## CARS, INDUSTRIAL V. DUMPING

\*Insley Mfg. Co., Indianapolis, Ind.  
\*Lakewood Eng. Co., Cleveland, Ohio  
Atlas Car & Mfg. Co., Cleveland, Ohio  
Austin Mfg. Co., Chicago  
Case Crane & Engg. Co., Columbus, O.  
Chase Fdry. & Mfg. Co., Columbus, Ohio  
Easton Car & Const. Co., Easton, Pa.  
C. W. Hunt Co., W. New Brighton, N. Y.  
Koppel Ind. Car & Equip. Co., Koppel, Pa.  
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.

United Ir. Wks., Inc., Kansas City, Mo.  
Weller Mfg. Co., Chicago  
Whiting Corp., Harvey, Ill.

## CARTS, CONCRETE

\*General Wheelbarrow Co., Cleveland, Ohio  
\*Insley Mfg. Co., Indianapolis, Ind.  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*Ransome Conc. Mch. Co., Duxellen, N. J.  
Acme Rd. Machy. Co., Frankfort, N. Y.  
Case Crane & Engg. Co., Columbus, O.  
Chattanooga Wheelbarrow Co., Chattna, Tenn.  
Cleveland Wheelbarrow Co., Cleveland, Ohio  
Easton Car & Const. Co., Easton, Pa.  
E. D. Klayre & Co., Oregon, Ill.  
Gray Iron Fdry. Co., Reading, Pa.  
Jackson Mfg. Co., Harrisburg, Pa.  
Lansing Co., Lansing, Mich.  
Lee Trailer & Body Co., Plymouth, Ind.  
Sterling Wheelbarrow Co., Milwaukee  
Toledo Wheelbarrow Co., Toledo, Ohio

## CAST IRON PIPE (See Pipe, Cast Iron)

## CASTINGS, STEEL

\*Brown Clutch Co., Sandusky, Ohio  
\*Cleveland Steel Tool Co., Cleveland  
\*G. H. Williams Co., Erie, Pa.  
Farrell-Cheek Steel Fdy. Co., Sandusky, Ohio  
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

## CASTINGS, STREET AND SEWER

\*Armco Culvert Mfrs. Assn., Middletown, Ohio  
\*Central Fdry. Co., N. Y.  
\*U. S. Pipe & Fdry. Co., Burlington, N. J.  
Canton Fdry. & Mach. Co., Canton, Ohio  
H. W. Clark Co., Mattoon, Ill.  
J. B. Clow & Sons, Chicago  
W. E. Deo Co., Chicago  
Donley Bros. Co., Cleveland  
Elkhart Fdry. & Mach. Co., Elkhart, Ind.  
Gallion Iron Works & Mfg. Co., Gallen, O.  
Gilbert Mfg. Co., Aberdeen, S. Dak.  
Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
Klauer Mfg. Co., Dubuque, Iowa  
Madison Fdry. Co., Cleveland, Ohio  
Pechstein Iron Works, Keokuk, Iowa  
Sessions Foundry Co., Bristol, Conn.  
South Bend Fdry. Co., So. Bend, Ind.

## CATCH BASINS (See Castings, Street)

## CATCH BASIN CLEANING OUTFITS

Atia Sales Corp., New York  
Elgin Sales Corp., N. Y.  
Mack Trucks, Inc., N. Y.

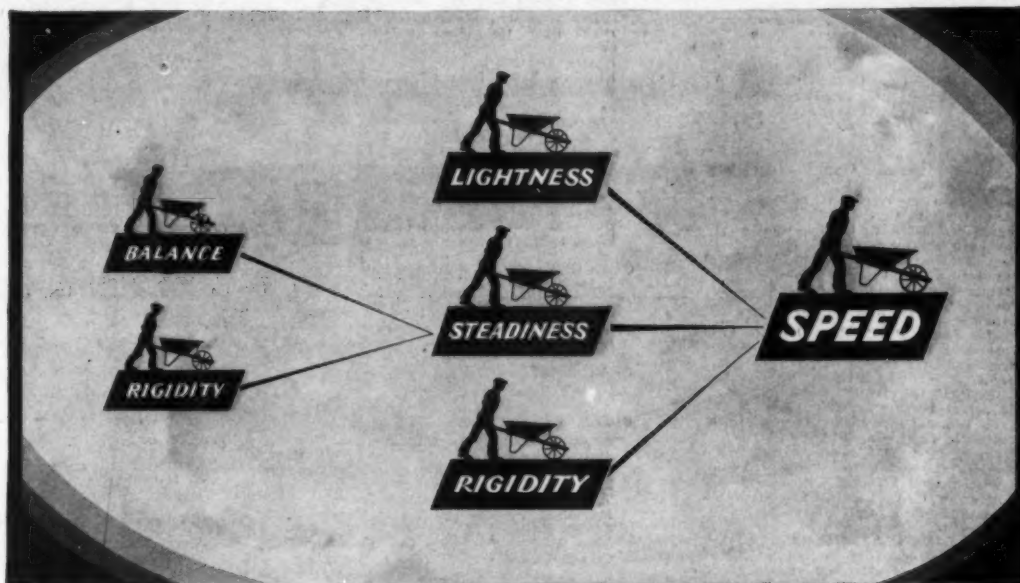
## CAULKING MACHINERY AND TOOLS

\*Independent Pn. Tool Co., Chicago  
Cleveland Rock Drill Co., Cleveland, Ohio  
Helwig Mfg. Co., St. Paul, Minn.  
Ingersoll-Rand Co., New York  
Mueller Company, Decatur, Ill.

## CEMENT—(P. C. stands for Portland Cement)

\*Pittsburgh Plate Glass Co., Barborton, Ohio  
Acme Cement Corp., Catskill, N. Y.  
Aetna P. C. Co., Detroit, Mich.  
Allentown P. C. Co., Catsanqua, Pa.  
Alpha P. C. Co., Easton, Pa.  
Ash Grove Lime & P. C. Co., Kansas City, Mo.  
Atlas P. C. Co., N. Y.  
Beaver P. C. Co., Portland, Ore.  
Bessemer Limestone & C. Co., Youngstown, O.  
British Col. Cement Co., Victoria, B. C.  
Canada Cement Co., Ltd., Montreal, Canada  
Colorado P. C. Co., Denver, Colo.  
Consolidated Cement Corp., Chicago  
Cowell P. C. Co., Lowell, Cal.  
Crescent P. C. Co., Wampum, Pa.  
Dewey P. C. Co., Kansas City, Mo.  
Diamond P. C. Co., Cleveland, Ohio  
Edison P. C. Co., N. Y.  
Georgia Cement & Stone Co., Birmingham, Ala.  
Giant P. C. Co., Philadelphia, Pa.  
Glens Falls P. C. Co., Glens Falls, N. Y.  
Golden State P. C. Co., Los Angeles, Cal.  
Great West'n P. C. Co., Kansas City, Mo.  
Hawkeye P. C. Co., Des Moines, Iowa  
Hercules Cement Corp., Philadelphia  
Hermitage P. C. Co., Nashville, Tenn.  
Huron P. C. Co., Detroit, Mich.  
International Cement Corp., N. Y.  
International P. C. Co., Ltd., Spokane, Wash.  
Kosmos P. C. Co., Louisville, Ky.  
La Tolteca Compania de Cemento Portland, Mexico City, Mex.  
Lawrence Cement Co., New York  
Lehigh P. C. Co., Allentown, Pa.  
Louisville Cement Co., Louisville, Ky.  
Manitowoc P. C. Co., Manitowoc, Wis.  
Marlboro Cement Co., Edmonton, Can.  
Marquette Cement Mfg. Co., Chicago  
Missouri P. C. Co., St. Louis, Mo.

# **Speed—Means—Contracts Completed—on—Time!**



*If the contractor's crews are to keep moving quickly, without interruption, his wheelbarrows must have speed built into them. Speed arises out of lightness, steadiness, and rigidity.*



## **EMPIRE Road Grader Blades**

Empire Road Grader Blades have been furnished for over 40 years to leading road grader manufacturers. They are now being marketed direct through distributors by General Wheelbarrow Company. They are made of a new, exclusive alloy steel, and have an exact degree of curvature for better grading. Ask for our folder on "Highway Equipment."

**G**ENERAL Wheelbarrows are light because the load is properly distributed to wheel and handles. The tray has been placed far enough front to throw most of the weight over the wheel, and yet keep enough in the operator's hands to control the load.

General Wheelbarrows are steady because they are balanced properly from side to side: they don't tip. They are rigid and solid: they don't loosen up and "give" in the wheeler's hands. They make your men confident of themselves. They increase your output per man.



*"From all the barrows on the job, the workman picks the General."*

## **GENERAL WHEELBARROW COMPANY**

Associated Companies:

The Empire Plow Co.

General Wheelbarrow Co.

Headquarters for Wheelbarrows, Concrete Carts, Steel Mortar Boxes, Salamanders, Coal Chutes, Agricultural Implements, Plow Shapes, Scrapers, Road Grader Blades

3140 East 65th Street

Cleveland, Ohio

**LOOK FOR THE ORANGE HANDLES**

When writing to advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.



# Where to Purchase

## CEMENT (Continued)

Monarch Cement Co., Humboldt, Kas.  
Monolith P. C. Co., Los Angeles, Cal.  
National Cement Co., Birmingham, Ala.  
Nazareth Cement Co., Nazareth, Pa.  
Nebraska Cement Co., Denver, Colo.  
Newago P. C. Co., Newago, Mich.  
New Egyptian P. C. Co., Detroit  
North Amer. Cement Corp., Albany, N. Y.  
Northwestern States P. C. Co., Mason City, Ia.  
Oklahoma P. C. Co., Denver  
Olympic P. C. Co., Ltd., Seattle  
Oregon P. C. Co., Portland, Ore.  
Pacific P. C. Co., San Francisco  
Peerless P. C. Co., Detroit, Mich.  
Peninsular P. C. Co., Cement City, Mich.  
Penn-Allen Cement Co., Nazareth, Pa.  
Pennsylvania-Dixie Cement Corp., N. Y.  
Petoskey P. C. Co., Petoskey, Mich.  
Phoenix P. C. Co., Philadelphia  
P. C. Co. of Utah, Salt Lake City  
Pyramid P. C. Co., Des Moines  
Riverside P. C. Co., Los Angeles  
St. Marys Cement Co., Toronto, Can.  
San Antonio P. C. Co., San Antonio  
Sandusky Cement Co., Cleveland, Ohio  
Santa Cruz P. C. Co., San Francisco  
Signal Mountain P. C. Co., Chattanooga, Tenn.  
Southern States P. C. Co., Rockport, Ga.  
Southwest P. C. Co., Los Angeles, Cal.  
Standard P. C. Co., Cleveland  
Standard P. C. Co., Cleveland  
Sun P. C. Co., Portland, Ore.  
Superior P. C. Co., Seattle, Wash.  
Three Forks P. C. Co., Denver, Colo.  
Tidewater P. C. Co., Baltimore, Md.  
Trinity P. C. Co., Dallas, Tex.  
Union P. C. Co., Denver, Colo.  
U. S. P. C. Co., Chicago  
Universal P. C. Co., Ogden, Utah  
Valcanite P. C. Co., Philadelphia  
Webb P. C. Co., Detroit  
Warrior Cement Corp., Chatto, Tenn.  
Wellston Iron Furnace Co., Jackson, Ohio  
Wolverine P. C. Co., Coldwater, Mich.  
Wyandotte P. C. Co., Detroit

## CEMENT BLOCK MACHINES

Abrams Cement Tool Co., Detroit, Mich.  
Cement Block Machy. Co., Newark, N. J.  
Eagelmeyer Cast Stone Block Machy Co., Bay City, Mich.

## CEMENT GUNS

Cement-Gun Co., Allentown, Pa.

## CEMENT INSPECTION (See Inspecting Laboratories)

## CEMENT TOOLS

\*American Fork & Hoe Co., Cleveland  
Abrams Cement Tool Co., Detroit

## CENTRIFUGAL PUMPS (See Pumps, Centrifugal)

## CHAINS

\*Chain Belt Co., Milwaukee, Wis.  
Amer. Chain Co., Inc., Bridgeport, Conn.  
Columbus McKinnon Chain Co., Columbus, O.  
Diamond Chain & Mfg. Co., Indianapolis, Ind.  
Jeffrey Mfg. Co., Columbus, Ohio  
Link-Belt Co., Chicago  
U. S. Chain & Forge Co., Pittsburgh, Pa.  
Webster Mfg. Co., Chicago  
Weller Mfg. Co., Chicago

## CHIMNEYS, CONCRETE

Heine Chimney Co., Chicago  
Rust Engineering Co., Pittsburgh, Pa.  
Weber Chimney Co., Chicago

## CHIMNEYS, RADIAL BRICK

Amer. Chimney Corp., N. Y.  
Continental Chimney Co. of Chicago, Chicago  
Alphons Castella Chimney Const. Co., N. Y.  
Heine Chimney Co., Chicago  
H. R. Heinicke, Inc., Indianapolis, Ind.  
M. W. Kellogg & Co., N. Y.  
Rust Eng. Co., Pittsburgh, Pa.

## CHIMNEYS, STEEL (See Stacks, Steel)

## CHISELS, CHIPPING

\*Cleveland Steel Tool Co., Cleveland, Ohio

## CHLORINATORS

\*Wallace & Tiernan Co., Inc., Newark, N. J.  
Norwood Engr. Co., Florence, Mass.  
Paradon Mfg. Co., Arlington, N. J.

## CHLORINE, LIQUID (See Liquid Chlorine)

## CLUTCHES, CONCRETE

\*Insley Mfg. Co., Indianapolis, Ind.  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*Ransome Const. Mch. Co., Danville, N. J.

## CLAMPS & TIES, FORM

\*Insley Mfg. Co., Indianapolis  
Batavia Clamp Co., Inc., Batavia, N. Y.  
Concrete Form-Hold Co., Inc., Oliver City, Cal.  
Concrete Form Tie Corp., Pittsburgh, Pa.  
Eay-Set Wall Tie Co., Dayton, O.  
W. A. Kuhlmann & Co., Toledo  
M. & M. Wire Clamp Co., Minneapolis  
James L. Taylor Mfg. Co., Poughkeepsie, N. Y.  
Wedgit Tie Co., Inc., New York

## CLAMPS, COLUMN

\*Ellis & Ford Mfg. Co., Detroit, Mich.  
\*Insley Mfg. Co., Indianapolis, Ind.  
Black Bros. Co., Mendota, Ill.  
Concrete Eng. Co., Omaha, Neb.  
Handy Mfg. Co., Chicago  
Kardong Bros., Inc., Minneapolis  
W. A. Kuhlmann & Co., Toledo, Ohio  
M. & M. Wire Clamp Co., Minneapolis  
The O. D. G. Co., Owensboro, Ky.  
J. E. Porter Corp., Ottawa, Ill.  
H. W. Ross Co., Cincinnati  
Steelform Contracting Co., San Francisco  
Sterling Wheelbarrow Co., Milwaukee  
Symons Clamp & Mfg. Co., Chicago  
James L. Taylor Mfg. Co., Poughkeepsie, N. Y.  
Universal Form Clamp Co., Chicago  
Wedgit Tie Co., Inc., New York

## CLAY DIGGERS, PNEUMATIC

\*Independent Pne. Tool Co., Chicago  
\*Sullivan Machy. Co., Chicago  
Chicago Pneumatic Tool Co., New York  
Gardner-Denver Co., Quincy, Ill.  
Ingersoll-Rand Co., New York

## CLAY PIPE

(See Pipe, Vitrified Clay)

## CLIPS, WIRE ROPE

\*Amer. Steel & Wire Co., Chicago  
Amer. Hoist & Derrick Co., St. Paul, Minn.  
Fischer & Hayes Rope & Steel Co., Chicago  
Hazard Wire Rope Co., Wilkesbarre, Pa.  
Thos. Laughlin Co., Portland, Me.  
Marion Malleable Iron Works, Marion, Ind.  
C. M. Mockbee & Co., Cincinnati, Ohio  
John A. Roebbing Sons Co., Trenton, N. J.  
Upson-Walton Co., Cleveland, Ohio

## CLUTCHES

\*Brown Clutch Co., Sandusky, Ohio  
\*Twin Disc Clutch Co., Racine, Wis.  
\*Waukesha Motor Co., Waukesha, Wis.  
Brown-Lips Gear Co., Syracuse, N. Y.  
Link-Belt Co., Chicago

## COCKS, CURB AND CORPORATION

Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Glauber Brass Mfg. Co., Cleveland, Ohio  
Haydenville Co., Haydenville, Mass.  
Hays Mfg. Co., Erie, Pa.  
Mueller Co., Decatur, Ill.  
Union Wtr. Mtr. Co., Worcester, Mass.

## COMPRESSORS, AIR (See Air Compressors)

## CONCRETE BLOCK MACHINES (See Cement Block Machines)

## CONCRETE CURING

\*Barber Asphalt Co., Philadelphia  
\*Dew Chemical Co., Midland, Mich.  
\*McEverlast, Inc., Los Angeles, Calif.  
\*Pittsburgh Plate Glass Co., Barberton, Ohio  
\*Seivay Sales Corp., New York

## CONCRETE HEATERS

\*Chausse Oil Burner Co., Elkhart, Ind.  
\*Connery & Co., Philadelphia, Pa.  
\*Alex. Mulburn Co., Baltimore, Md.  
Aeroll Burner Co., West New York, N. J.  
Hauck Mfg. Co., Brooklyn, N. Y.  
Littleford Bros., Cincinnati

## CONCRETE MIXERS

\*Amer. Cem. Mch. Co., Inc., Keokuk, Iowa  
\*Atlas Engineering Co., Clintonville, Wis.  
\*Jaeger Mach. Co., Columbus, Ohio  
\*Kochring Co., Milwaukee, Wis.  
\*Lakewood Eng. Co., Cleveland, Ohio  
\*Lansing Co., Lansing, Mich.  
\*John Lansing Mfg. Co., New Holstein, Wis.  
\*Ransome Const. Mch. Co., Danville, N. J.  
Acme Rd. Machy. Co., Frankfort, N. Y.  
Anchor Mfg. Co., Chicago  
Archer Iron Works, Chicago  
Badger Con. Mixer Co., Milwaukee  
Chain Belt Co., Milwaukee, Wis.  
Construction Mch. Co., Waterloo, Iowa  
Norris K. Davis, San Francisco, Calif.  
J. B. Foote Fdry. Co., Fredericktown, Ohio  
Gray Iron Fdry. Co., Reading, Pa.  
Judy Mfg. Co., Centerville, Iowa  
Knickerbocker Co., Jackson, Mich.  
Kwik-Mix Concrete Mixer Co., Fort Washington, Wis.  
Leach Co., Oshkosh, Wis.  
Mixermobile Co., Milwaukee  
Orr & Semberger, Reading, Pa.

Rommel Mfg. Co., Kewaskum, Wis.  
Republic Iron Works, Tecumseh, Mich.  
T. L. Smith Co., Milwaukee

## CONCRETE PAVERS (See Pavers, Concrete)

## CONCRETE PILING (See Piling)

## CONCRETE PIPE (See Pipe, Concrete)

## CONCRETE REINFORCEMENT

\*American Steel & Wire Co., Chicago  
\*Truscon Steel Co., Youngstown, Ohio  
Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie Steel Co., Pittsburgh, Pa.  
Concrete Steel Co., N. Y.  
Consolidated Exp. Metal Co., Wheeling, W. Va.  
Electric Welding Co., Pittsburgh, Pa.  
Ft. Pitt Bridge Works, Pittsburgh, Pa.  
Gensere Steel Co., Youngstown, Ohio  
Inland Steel Co., Chicago  
Kalmann Steel Co., Chicago  
Laclede Steel Co., St. Louis, Mo.  
National Steel Fabric Co., Pittsburgh  
Republic Iron & Steel Co., Youngstown, Ohio  
J. T. Myerson & Son, Chicago  
Wickwire-Spencer Steel Co., N. Y.  
Youngstown Pressed Steel Co., Warren, Ohio

## CONCRETE ROAD FINISHERS

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*A. W. French & Co., Chicago  
\*Holtzcliff Steel Form & Iron Co., Warren, Ohio  
\*Lakewood Eng. Co., Cleveland, Ohio

## CONDENSERS

\*Allis-Chalmers Mfg. Co., Milwaukee  
Ingersoll-Rand Co., N. Y.  
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.  
Wheeler Cond. & Eng. Co., Carteret, N. J.  
Worthington Pump & Machy. Corp., N. Y.

## CONDUIT RODS

F. Bissell Co., Toledo, Ohio  
Turbine Sewer Mch. Co., Milwaukee  
Waldo Bros. & Bond Co., Boston

## CONDUITS, UNDERGROUND

Amer. Vittr. Products Co., Akron, Ohio  
Johns-Manville, Inc., N. Y.  
National Fireproofing Co., N. Y.  
Rie-wil Co., Cleveland

## CONTRACTORS' EQUIPMENT DEALERS (See Pages 131 to 155)

## CONVEYORS, BELT

\*Atlas Engineering Co., Clintonville, Wis.  
\*Austin-Western Rd. Mch. Co., Chicago  
\*Barber-Greene Co., Aurora, Ill.  
\*The Burch Corp., Orestine, Ohio  
\*Chicago Automatic Conv. Co., Chicago  
\*Conveying Weigher Co., New York  
\*Fairfield Engineering Co., Marion, Ohio  
\*Good Rds. Mch. Co., Kennett Sq., Pa.  
\*Geo. Hais Mfg. Co., N. Y.  
\*Jos. Honhorst Co., Cincinnati  
\*Industrial Brownhoist Corp., Cleveland  
Austin Mfg. Co., Chicago  
C. O. Bartlett & Snow Co., Cleveland  
Chain Belt Co., Milwaukee, Wis.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Gifford Wood Co., Hudson, N. Y.  
Jeffrey Mfg. Co., Columbus, Ohio  
Link-Belt Co., Chicago  
New Holland Mch. Co., N. Holland, Pa.  
Northern Conveyor Co., Janesville, Wis.  
Samuel Olson & Co., Chicago  
Portable Machinery Co., Clifton, N. J.  
Robins Conv. Belt Co., N. Y.  
Jas. B. Seaverns Co., Batavia, Ill.  
Smith Eng. Wks., Milwaukee  
Standard Conv. Co., No. St. Paul, Minn.  
Stephens-Adamsen Mfg. Co., Aurora, Ill.  
Universal Crusher Co., Cedar Rapids, Iowa  
Webster Mfg. Co., Chicago  
Weller Mfg. Co., Chicago

## CONVEYORS, BUCKET

\*Atlas Engineering Co., Clintonville, Wis.  
\*Chicago Automatic Conv. Co., Chicago  
\*Conveying Weigher Co., N. Y.  
\*Fairfield Engineering Co., Marion, Ohio  
\*Good Rds. Mch. Co., Kennett Sq., Pa.  
\*Geo. Hais Mfg. Co., N. Y.  
\*Jos. Honhorst Co., Cincinnati, Ohio  
\*Industrial Brownhoist Corp., Cleveland  
Austin Mfg. Co., Chicago  
C. O. Bartlett & Snow Co., Cleveland, Ohio  
H. W. Caldwell & Son, Chicago  
Chain Belt Co., Milwaukee, Wis.  
Gifford Wood Co., Hudson, N. Y.  
Godfrey Conv. Co., Elkhart, Ind.  
Guarantee Constn. Co., N. Y.  
Jeffrey Mfg. Co., Columbus, Ohio  
Link-Belt Co., Chicago  
Mead-Morrison Mfg. Co., E. Boston, Mass.  
New Holland Mach. Co., N. Holland, Pa.  
Samuel Olson & Co., Chicago  
Republic Rubber Co., Youngstown, Ohio  
Robins Conv. Belt Co., N. Y.  
Jas. B. Seaverns Co., Batavia, Ill.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



## In Chile~

### 3,500 miles from the factory— BUCYRUS-ERIE reliability again shows its value

If by the magic of television you could watch the operations at the mines of the Anglo Chilean Consolidated Nitrate Corporation, you'd see 20 BUCYRUS-ERIES slashing through the hard nitrate deposit.

These powerful diggers—14 BUCYRUS-ERIE heavy duty 3-yd. electrics, and 6 Diesels—were chosen because of the unequalled **Reliability** of BUCYRUS-ERIES.

The owners need not worry about the many miles separating these mines from the plant where their shovels were built. They know from experience that the greater sturdiness of BUCYRUS-ERIES keeps them working steadily month after month, with minimum maintenance.

All over the world, you find big mining and

engineering operations being carried through successfully because of the reliability of BUCYRUS-ERIES.

The greater strength of BUCYRUS-ERIES  
is an asset in *any* location—

—and you find this extra sturdiness in the complete line, from the ½-yd. gasoline outfit to the mammoth 16-yd. electric stripper.

Write us—we'll be glad to send performance records showing what BUCYRUS-ERIES have done on work like yours.

#### BUCYRUS-ERIE COMPANY

General Offices: South Milwaukee, Wis.

Plants: South Milwaukee, Wis.; Erie, Pa.; Evansville, Ind.

Adv. 741

Representatives throughout the U. S. A.  
Offices and distributors in all  
principal countries of  
the world.



Boston  
New York  
Philadelphia  
Atlanta

#### BRANCH OFFICES:

Birmingham  
Pittsburgh  
Buffalo  
Detroit

Chicago  
St. Louis  
Dallas  
San Francisco

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

# Where to Purchase

## CONVEYORS, BUCKET (Continued)

Stephens Adamson Mfg. Co., Aurora, Ill.  
Universal Crusher Co., Cedar Rapids, Iowa  
Webster Mfg. Co., Chicago  
Weller Mfg. Co., Chicago

## CONVEYORS, GRAVITY

Lamson Co., Syracuse, N. Y.  
Logan Co., Louisville, Ky.  
Mathews Conveyor Co., Elwood City, Pa.  
Standard Conv. Co., No. St. Paul, Minn.

## COUPLINGS, HOSE

\*Independent Pneumatic Tool Co., Chicago  
Cleveland Pneum. Tool Co., Cleveland, Ohio  
Gilman Mfg. Co., East Boston, Mass.  
Ingersoll-Rand Co., N. Y.  
W. H. Keller, Inc., Grand Haven, Mich.  
Muleconroy Co., Philadelphia

## CRANES, CRAWLER

\*Ray City Shovel, Inc., Ray City, Mich.  
\*Bucyrus-Erie Co., Erie, Pa.  
\*Industrial Brownhoist Corp., Cleveland  
\*Mantowee Engr. Works, Manitowee, Wis.  
\*Osgood Company, Marion, Ohio  
\*Thor Shovel Co., Lorain, Ohio  
\*Trackson Co., Milwaukee  
\*Universal Crane Co., Lorain, Ohio  
Austin Machy. Corp., Muskegon, Mich.  
Byers Mach. Corp., Muskegon, Mich.  
General Excavator Co., Marion, Ohio  
Link-Belt Co., Chicago  
McMyler Interstate Co., Cleveland  
Mead-Morrison Mfg. Co., Boston  
Ohio Power Shovel Co., Lima, O.  
Orion Crane & Shovel Co., Chicago  
Star Drilling Mach. Co., Akron, Ohio

## CRANES, LOCOMOTIVE

\*Ray City Shovel, Inc., Ray City, Mich.  
\*Bucyrus-Erie Co., Erie, Pa.  
\*Industrial Brownhoist Corp., Cleveland  
\*Kochling Co., Milwaukee  
\*Mantowee Engr. Works, Manitowee, Wis.  
\*Osgood Company, Marion, Ohio  
\*Parsons Co., Newton, Iowa  
\*Thor Shovel Co., Lorain, Ohio  
Amer. Hat. & Derrick Co., St. Paul, Minn.  
Browning Crane Co., Cleveland, Ohio  
Davenport Loc. Works, Davenport, Iowa  
Link-Belt Co., Chicago  
Loc. Crane Co. of Amer., Champaign, Ill.  
Marion Steam Shovel Co., Marion, Ohio  
McMyler Interstate Co., Cleveland, Ohio  
Northwest Eng. Works, Chicago  
Ohio Loc. Crane Co., Bucyrus, Ohio  
Orion Crane & Shovel Co., Chicago  
Jas. B. Savarous Co., Batavia, Ill.  
Speeder Machy. Corp., Cedar Rapids, Iowa  
U. S. Crane Co., Chicago

## CRANES, ONE-TON

Hughes-Keenan Co., Mansfield, Ohio  
Otis Eng. Co., New York  
Sterling Tractor Equipment Co., New York  
Whitehead & Kales Co., Detroit, Mich.

## CRANES, OVERHEAD TRAVELING

\*Erie Steel Const'n. Co., Erie, Pa.  
Alliance Mach. Co., Alliance, O.  
Chesapeake Iron Wks., Baltimore, Md.  
Chisholm-Moore Mfg. Co., Cleveland  
Curtis Pa. Machy. Co., St. Louis  
Harnischfeger Corp., Milwaukee, Wis.  
Milwaukee Elec. Crane Co., Milwaukee  
Morgan Eng. Co., Alliance, O.  
Northern Eng. Wks., Detroit, Mich.  
Shaw Crane Wks., Muskegon, Mich.  
Shepard Elec. Cr. & Hst. Co., Montour Falls, N. Y.  
Toledo Crane Co., Bucyrus, O.  
Whiting Fdry. & Equip. Co., Harvey, Ill.

## CRANES, TRUCK

\*Universal Crane Co., Lorain, Ohio  
Atlas Sales Corp., New York  
Bay City Fdry. & Mach. Co., Bay City, Mich.  
Browning Crane Co., Cleveland  
Byers Mach. Co., Ravenna, O.  
Ersted Mfg. Co., Portland, Ore.  
Orion Crane & Shovel Co., Chicago  
Harnischfeger Corp., Milwaukee, Wis.

## CRANES, WRECKING

\*Bucyrus-Erie Co., Erie, Pa.  
\*Industrial Brownhoist Corp., Cleveland  
Industrial Wks., Bay City, Mich.

## CRAWLER ATTACHMENTS

\*Geo. Haiss Mfg. Co., N. Y.  
\*Trackson Co., Milwaukee, Wis.  
Belle City Mfg. Co., Racine, Wis.  
Link-Belt Co., Chicago

## CREEPER WHEELS

\*Creeper Wheel Co., Reading, Pa.

## CROSBOTED BLOCKS, TIMBER, ETC.

Amer. Croos. Co., Inc., Louisville, Ky.  
Amer. Croos. Wks., Inc., New Orleans, La.  
Ayer & Lord Tie Co., Chicago  
Carter Bloxmond Flooring Co., K. City, Mo.

Colonial Cra. Co., Inc., Louisville, Ky.  
Compressed Wood Preserv. Co., Cincinnati, O.  
Croos. Materials Co., New Orleans, La.  
Georgia Croos. Co., Louisville, Ky.  
Jennison-Wright Co., Toledo, O.  
Long Bell Lumber Co., Kansas City, Mo.  
Midland Croos. Co., Granite City, Ill.  
Pennacola Croos. Co., Pensacola, Fla.  
Republic Croos. Co., Indianapolis, Ind.  
Southern Wood Pres. Co., Atlanta, Ga.  
Wyckoff Pipe & Croos. Co., N. Y.

## CRUSHERS, ROCK

\*Austin-Western Rd. Mach. Co., Chicago  
\*Good Eds. Machy. Co., Kennett Sq., Pa.  
Acme Rd. Machy. Co., Frankfurt, N. Y.  
Austin Mfg. Co., Chicago  
Gallon Jr. Wks. & Mfg. Co., Gallon, O.  
New Eng. Road Machy. Co., So. Boston, Mass.  
New Holland Mach. Co., New Holland, Pa.  
Russell Grader Mfg. Co., Minneapolis  
Smith Eng. Wks., Milwaukee  
Sturtevant Mill Co., Boston  
Universal Crusher Co., Cedar Rapids, Ia.  
Universal Rd. Machy. Co., Kingston, N. Y.  
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

## CULVERTS, CAST IRON

\*U. S. Pipe & Fdry. Co., Burlington, N. J.  
American Casting Co., Birmingham, Ala.  
Amer. C. I. Pipe Co., Birmingham, Ala.  
Beach Mfg. Co., Charlotte, Mich.  
Gallon Iron Wks. & Mfg. Co., Gallon, O.  
Gilbert Mfg. Co., Aberdeen, S. D.  
R. D. Wood & Co., Philadelphia

## CULVERTS, CORRUGATED METAL

\*Armco Culvert Mfrs. Assn., Middletown, O.  
\*Austin-Western Rd. Mach. Co., Chicago  
\*Good Eds. Machy. Co., Kennett Sq., Pa.  
American Casting Co., Birmingham, Ala.  
Austin Mfg. Co., Chicago  
Bark River Bridge & Culv. Co., Bark River, Mich.  
Beach Mfg. Co., Charlotte, Mich.  
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.  
Berger Mfg. Co., Jacksonville, Fla.  
Boardman Co., Okla. City, Okla.  
Burnham Mfg. Co., Woods Cross, Utah  
Calif. Corr. Culv. Co., W. Berkeley, Cal.  
Canada Ingot Ir. Co., Ltd., Guelph, Ont.  
Canton Culv. & Sile Co., Canton, O.  
Corr. Culv. Co., Moberly, Mo.  
Decatur Cornice & Roofing Co., Albany, Ala.  
Dixie Culv. & Metal Co., Atlanta, Ga.  
Dixie Culv. Mfg. Co., Little Rock, Ark.  
Edwards Mfg. Co., Cincinnati  
Gallon Iron Wks. & Mfg. Co., Gallon, O.  
Gilbert Mfg. Co., Aberdeen, S. D.  
R. Hardisty Mfg. Co., Denver, Colo.  
Highway Prod. & Mfg. Co., Elmira, N. Y.  
Ind. Corr. Culv. Co., Mason City, Ia.  
Iowa Pure Ir. Co., Des Moines, Ia.  
Kentucky Culvert Mfg. Co., Louisville, Ky.  
Klauser Mfg. Co., Dubuque, Ia.  
Lyle Culv. & Rd. Equip. Co., Minneapolis, Minn.  
Md. Culv. & Metal Co., Baltimore  
N. E. Metal Culv. Co., Palmer, Mass.  
Nebraska Culv. & Mfg. Co., Wahoo, Neb.  
New England Metal Culvert Co., Nashua, N. H.  
Newport Culvert Co., Newport, Ky.  
Northfield Ir. Co., Northfield, Minn.  
Northwest's Sheet & Ir. Wks., Wahpeton, N.D.  
Ohio Corr. Culv. Co., Middletown, O.  
W. Q. O'Neill Co., Crawfordville, Ind.  
Pure Iron Culvert & Mfg. Co., Portland, Ore.  
Road Supply & Metal Co., Topeka, Kan.  
St. Paul Corr. Co., St. Paul, Minn.  
Sioux Falls Metal Culv. Co., Sioux Falls, S. D.  
So. Metal Culv. Co., Salisbury, N. C.  
Spokane Culv. & Tank Co., Spokane, Wash.  
Tenn. Metal Culv. Co., Nashville  
U. S. Br. & Culv. Co., Bay City, Mich.  
Virginia Culvert Corp., Roanoke, Va.  
Western Metal Mfg. Co., Houston, Tex.  
Wheeling Corr. Co., Wheeling, W. Va.  
Wyatt Metal & Blr. Wks., Dallas, Tex.

## CULVERT FORMS

\*Blaw-Knox Company, Pittsburgh, Pa.  
\*Heltzel Steel Form & Iron Co., Warren, O.  
Concrete Form Co., Inc., Syracuse, N. Y.  
Northfield Iron Co., Northfield, Minn.

## CURE BOXES

H. W. Clark Co., Mattoon, Ill.  
J. B. Clow & Sons, Chicago  
Columbian Iron Wks., Chattanooga, Tenn.  
Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
Madison Fdry. Co., Cleveland, O.  
Mueller Co., Decatur, Ill.  
J. S. Schofield's Sons Co., Macon, Ga.  
R. D. Wood & Co., Philadelphia, Pa.

## CURE, GUTTER AND BASE FORMS (See Forms, Concrete)

## CURE GUARDS, STEEL

W. S. Godwin Co., Baltimore

## CURE, STEEL PROTECTED

\*Truscon Steel Co., Youngstown, O.  
Concrete Steel Co., N. Y.

## CURING OF CONCRETE

\*Barber Asphalt Co., Philadelphia  
\*Dow Chemical Co., Midland, Mich.  
\*McEverlast, Inc., Los Angeles, Calif.  
\*Pittsburgh Plate Glass Co., Harborton, Ohio  
\*Solway Sales Corp., N. Y.

## CUTTERS, PIPE, HAND

\*Ellis & Ford Mfg. Co., Detroit  
Armstrong Mfg. Co., Bridgeport, Ct.  
Barnes Tool Co., New Haven, Ct.  
Erie Tool Works, Erie, Pa.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Oswego Tool Co., Oswego, N. Y.  
Reed Mfg. Co., Erie, Pa.  
Walworth Mfg. Co., Boston

## CUTTERS, ROD AND WIRE

\*Kochling Co., Milwaukee, Wis.  
Buffalo Forge Co., Buffalo, N. Y.  
Carous Mfg. Co., Sterling, Ill.  
O. D. Edwards Mfg. Co., Albert Lea, Minn.  
Holwig Mfg. Co., St. Paul, Minn.  
M. & M. Wire Clamp Co., Minneapolis  
Morse-Starratt Prod. Co., Oakland, Calif.  
Worthington Pump & Machy. Corp., N. Y.

## CUTTING EDGES

\*Caterpillar Tractor Co., San Leandro, Cal.  
\*General Wheelbarrow Co., Cleveland  
J. D. Adams & Co., Indianapolis, Ind.  
Shunk Mfg. Co., Bucyrus, O.

## CUTTING AND WELDING APPARATUS (See Welding Apparatus)

## CYLINDER HEADS, RICARDO

\*Waukesha Motor Co., Waukesha, Wis.

## DERRICKS, GUY AND STIFF-LEG

\*Clyde Ir. Wks. Sales Co., Duluth, Minn.  
\*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
\*S. Flory Mfg. Co., Bangor, Pa.  
\*Insley Mfg. Co., Indianapolis, Ind.  
\*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
\*Saugen Derrick Co., Chicago  
Amer. Hat. & Derrick Co., St. Paul, Minn.  
John T. Horton Co., N. Y.  
Lakeside Bridge & Steel Co., N. Milwaukee, Wis.  
Lidgerwood Mfg. Co., Elizabeth, N. J.  
National Hstg. Eng. Co., Harrison, N. J.  
Street Bros. Mach. Wks., Chattanooga  
Superior Iron Wks., Superior, Wis.  
Universal Hstg. Machy. Corp., Buffalo

## DERRICKS, PIPE LAYING

\*Dobbie Fdry. & Mach. Co., Niagara Falls  
Lidgerwood Mfg. Co., Elizabeth, N. J.  
Street Bros. Mach. Wks., Chattanooga

## DERRICKS, REVOLVING

\*Clyde Ir. Wks. Sales Co., Duluth, Minn.  
\*Dobbie Fdry. & Mach. Co., Niagara Falls  
Street Bros. Mach. Wks., Chattanooga

## DERRICKS, STEEL

\*Clyde Ir. Wks. Sales Co., Duluth, Minn.  
\*Dobbie Fdry. & Mach. Co., Niagara Falls  
\*Hayward Co., N. Y.  
\*Insley Mfg. Co., Indianapolis, Ind.  
Amer. Hat. & Derrick Co., St. Paul  
Street Bros. Mach. Wks., Chattanooga  
Taylor Port. St. Derrick Co., Chicago

## DERRICKS, STEEL PORTABLE

\*Clyde Ir. Wks. Sales Co., Duluth, Minn.  
\*Dobbie Fdry. & Mach. Co., Niagara Falls  
Amer. Hat. & Derrick Co., St. Paul  
Lidgerwood Mfg. Co., Elizabeth, N. J.  
Street Bros. Mach. Wks., Chattanooga

## DERRICK FITTINGS

\*S. Flory Mfg. Co., Bangor, Pa.  
\*Hayward Co., N. Y.  
\*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
Amer. Hat. & Derrick Co., St. Paul  
Lidgerwood Mfg. Co., Elizabeth, N. J.  
Street Bros. Mach. Wks., Chattanooga

## DIAPHRAGM PUMPING OUTFITS

\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
\*John Lauson Mfg. Co., New Holstein, Wis.

## DIESEL ENGINES (See Engines, Oil)

## DISTRIBUTORS, TAR AND ASPHALT

\*Good Roads Machinery Co., Kennett Sq., Pa.  
E. D. Einyre & Co., Oregon, Ill.  
Kinney Mfg. Co., Boston  
Municipal Supply Co., So. Bend, Ind.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



CHAMPION DISTRIBUTOR—800 GAL.  
TYPE PU  
MODEL Y-74



Bulletin  
K B D

## CHAMPION DISTRIBUTORS

### Heater Type

### FOR THE MECHANICAL APPLICATION OF ASPHALTS, TARS AND HEAVY PRODUCTS

Adaptable to mounting on any truck of sufficient capacity. Built in 600-, 800- and 1,000-gallon capacities—larger or smaller units furnished if desired.

Equipped with special VIKING Pumps—only two working parts—no plungers, valves or springs. 350 g.p.m. capacity. Reversible feature.

Heating system embodies internal fire-box principle, eliminating warped shell or flue sheets and leaking flues.

On double unit, Type PU, power is furnished by 20-hp. LeRoi engine, located forward of tank. This location assures ample ventilation, a clean engine, protected when "backing up," and well away from burners—SAFETY FIRST.

### NOW THE CHAMPION COLD APPLICATION OIL DISTRIBUTORS

Especially constructed for the application of the lighter road oils, requiring no preheating.

Adaptable for mounting on small capacity, high-speed trucks.

An ideal distributor at an attractive price for any contractor, municipality, county or state roadway department.

#### Standard Sizes

500 gallon                      600 gallon

Other sizes if desired.

Adaptable to mounting on any standard truck chassis of sufficient capacity, equipped with power take-off attachment.

Bulletin KCO



### NOTE THESE FEATURES

Flanged fittings with wire inserted asbestos gaskets. A non-leaking system

Tanks of fire-box steel. Our "rivet-weld" method insures double strength tank construction with minimum weight

No exposed piping

Tubes and flues of best charcoal iron

Manifolds are strongest and lightest known—from alloy of aluminum—lengths 4 feet to 26 feet

Snap connections for attaching manifolds and filling hose. No wrenches required—connections made in "seconds" not "minutes"

More heating area

Two-speed clutch. Amidship gear box. A multiplicity of pump speeds irrespective of truck speed

Self-aligning roller-bearings—Alumite lubrication fittings used throughout

Entire system protected by patented relief, control and check valve, meaning safety and simplicity in operation

Heating system embodies internal fire-box principle, eliminating warped shell or flue sheets and leaking flues

And many more equally important features



CHAMPION COLD OIL DISTRIBUTOR—ON GRAHAM  
3-TON HIGH SPEED CHASSIS—MODEL R E S

# The Good Roads Machinery Co. Inc.

"A business established and in continuous operation for fifty-one years at Kennett Square—in Pennsylvania."

NEW YORK  
PITTSBURGH

Branches at  
WATERTOWN, MASS.

PHILADELPHIA  
CHICAGO

# Where to Purchase

## DISTRIBUTING PLANTS, CONCRETE

- \*Inley Mfg. Co., Indianapolis, Ind.
- \*Lakewood Eng. Co., Cleveland, O.
- \*Bansome Conc. Mch. Co., Danvers, N. J.

## DITCHING MACHINES (See Excavators)

## DOORS AND SHUTTERS, STEEL ROLLING

- Cornell Iron Wks., L. I. City, N. Y.
- Edwards Mfg. Co., Cincinnati, Ohio
- Holzer Sheet Metal Works, New Orleans, La.
- Kinnear Mfg. Co., Columbus, O.
- James Peters & Son, Philadelphia
- St. Paul Corrugating Co., St. Paul, Minn.
- Variety Rolling Door Co., Westerville, O.
- J. G. Wilson Corp., N. Y.

## DRAWS, ROAD

- \*Austin-Western Road Machinery Co., Chicago
- \*Caterpillar Tractor Co., San Leandro, Calif.
- \*General Wheelbarrow Co., Cleveland
- \*Good Roads Mach. Co., Kennett Square, Pa.
- Ame Road Mach. Co., Frankfort, N. Y.
- J. D. Adams & Co., Indianapolis, Ind.
- American Steel Scraper Co., Sidney, Ohio
- Beach Mfg. Co., Charlotte, Mich.
- O. D. Edwards Mfg. Co., Albert Lee, Minn.
- Gallen Iron Works & Mfg. Co., Gallen, O.
- Miskin Scraper Wks., Union, Ia.
- Shusser-McLean Scraper Co., Sidney, Ohio
- Stockland Road Machinery Co., Minneapolis
- Western Wheeled Scraper Co., Aurora, Ill.

## DRAWING INKS

- \*Falcon Works, Gunther Wagner, New York
- O. M. Higgins & Co., Brooklyn, N. Y.

## DREDGES

- \*Bay City Shovels, Inc., Bay City, Mich.
- \*Bucyrus-Erie Co., Erie, Pa.
- \*Hayward Co., N. Y.
- \*Osgood Company, Marion, Ohio
- Amer. Steel Dredge Co., Ft. Wayne, Ind.
- Ellicott Mach. Corp., Baltimore
- Marion Steam Shovel Co., Marion, O.
- Orton Crane & Shovel Co., Chicago
- J. S. Schofield's Sons Co., Macon, Ga.
- Stockton Iron Wks., Stockton, Cal.
- Street Bros. Mach. Wks., Chattanooga
- Superior Iron Wks., Superior, Wis.

## DREDGES, DIPPER

- \*Bay City Shovels, Inc., Bay City, Mich.
- \*Bucyrus-Erie Co., Erie, Pa.
- \*Osgood Company, Marion, Ohio
- Amer. Steel Dredge Co., Ft. Wayne, Ind.
- Link-Belt Co., Chicago
- Marion Steam Shovel Co., Marion, O.

## DREDGES, HYDRAULIC

- \*Bucyrus-Erie Co., Erie, Pa.
- Ellicott Mach. Corp., Baltimore
- Marion Steam Shovel Co., Marion, O.
- Morris Mach. Wks., Baldwinville, N. Y.

## DREDGING MACHINERY

- \*S. Flory Mfg. Co., Bangor, Pa.
- \*J. S. Mundy Htg. Engine Co., Newark, N. J.
- Lidgerwood Mfg. Co., Elizabeth, N. J.
- Street Bros. Mach. Wks., Chattanooga

## DRILL STEEL SHARPENERS (See Sharpeners)

## DRILLS, CORE

- \*McKiernan-Terry Drill Co., N. Y.
- \*Sanderson-Cyclone Drill Co., Orrville, O.
- \*Sullivan Mach. Co., Chicago
- Ingersoll-Rand Co., N. Y.

## DRILLS, ROCK

- \*The Buhl Company, Chicago
- \*Sanderson-Cyclone Drill Co., Orrville, O.
- \*Sullivan Mach. Co., Chicago
- Chicago Pneumatic Tool Co., New York
- Cleveland Pneum. Tool Co., Cleveland, O.
- Cleveland Rock Drill Co., Cleveland, O.
- Dalzell Co., Philadelphia
- Gardner-Denver Co., Quincy, Ill.
- Gilman Mfg. Co., E. Boston
- Hardace Wonder Drill Co., Ottumwa, Ia.
- Heiwig Mfg. Co., St. Paul, Minn.
- Ingersoll-Rand Co., New York
- W. H. Keller, Inc., Grand Haven, Mich.
- Wood Drill Wks., Paterson, N. J.

## DRILLS FOR WELLS AND BLAST HOLES (See Well Drilling Mach.)

## DRUMS, HOLDING

- \*Blaw-Knox Co., Pittsburgh, Pa.
- \*Clyde R. Wks. Sales Co., Duluth, Minn.
- \*Dobbie Fdry. & Mach. Co., Niagara Falls
- \*Hayward Co., New York
- \*Holtzel Steel Form & Ir. Co., Warren, O.
- Street Bros. Mach. Wks., Chattanooga

## DRYERS, ASPHALT AND CEMENT

- Allis-Chalmers Mfg. Co., Milwaukee
- Amer. Blower Co., Detroit, Mich.
- Atlas Dryer Co., Cleveland, O.
- C. O. Bartlett & Snow Co., Cleveland, O.
- F. D. Cummer & Son Co., Cleveland, O.
- Lancaster Iron Works, Inc., Lancaster, Pa.
- Ruggles-Coles Engineering Co., New York

## DRYERS, SAND AND GRAVEL

- \*Chausse Oil Burner Co., Elkhart, Ind.
- \*Jos. Hanherst Co., Cincinnati, O.
- Acroll Burner Co., West New York, N. J.

- American Process Co., New York
- O. O. Bartlett & Snow Co., Cleveland, O.
- Chase & Lyman, Boston
- Littleford Bros., Cincinnati, O.
- Alex. Milburn Co., Baltimore, Md.

## DUMP BODIES FOR CONCRETE

- Easton Car & Const. Co., Easton, Pa.
- Lee Trailer & Body Co., Plymouth, Ind.

## DUMP BODIES FOR MOTOR TRUCKS

- \*Columbian St. Tank Co., Kansas City, Mo.
- \*Highway Trailer Co., Edgerton, Wis.
- \*Wood Hydr. Hoist & Body Co., Detroit
- Amer. Prod. & Trad. Co., Chicago
- Am. Truck & Body Co., Martinsville, Va.
- Anthony Co., Streator, Ill.
- Atlas Sales Corp., New York
- Columbia Body Corp., Columbia, Pa.
- Detroit Trailer & Mach. Co., Detroit
- Detweiler Mfg. Co., Gallon, O.
- Eagle Wagon Wks., Auburn, N. Y.
- Easton Car & Const. Co., Easton, Pa.
- Gallia All Steel Body Co., Gallon, O.
- Griscom-Russell Co., N. Y.
- Hell Co., Milwaukee
- Herr Dump Car Mfg. Co., Coatesville, Pa.
- Hughes-Kennan Co., Mansfield, O.
- The Hug Co., Highland, Ill.
- Jennings Aut. Dump Body, Roanoke, Va.
- Lee Trailer & Body Co., Plymouth, Ind.
- Mack Trucks, Inc., N. Y.
- Mandt Body Co., Keokuk, Ia.
- Marion Steel Body Co., Marion, O.
- Martin-Parry Corp., York, Pa.
- N. Y. Central Ir. Wks., Hagerstown, Md.
- Pechstein Iron Wks., Keokuk, Ia.
- Stewart Iron Wks. Co., Cincinnati
- Van Dorn Iron Wks. Co., Cleveland, O.

## DUMP CARTS AND WAGONS, HOBBE

- \*Austin-Western Road Mach. Co., Chicago
- \*Electric Wheel Co., Quincy, Ill.
- \*Highway Trailer Co., Edgerton, Wis.
- Ame Road Mach. Co., Frankfort, N. Y.
- Ame Wagon Co., Emigsville, Pa.
- J. D. Adams & Co., Indianapolis
- Austin Mfg. Co., Chicago
- Bain Wagon Co., Kenosha, Wis.
- Columbia Body Corp., Columbia, Pa.
- Eagle Wagon Wks., Auburn, N. Y.
- Gilbert Mfg. Co., Aberdeen, S. D.
- G. H. Holzbog & Bro., Jeffersonville, Ind.
- LaPlant-Choute Mfg. Co., Cedar Rapids, Iowa
- Little Red Wagon Co., Omaha, Neb.
- Luedinghaus-Spenchled Wagon Co., St. Louis
- Russell Grader Mfg. Co., Minneapolis
- Smith Trailer Co., Syracuse, N. Y.
- Stockland Road Machinery Co., Minneapolis
- Streich Bros., Oshkosh, Wis.
- Western Wheeled Scraper Co., Aurora, Ill.

## DUMP WAGONS (ALL STEEL), TRACTOR

- \*Electric Wheel Co., Quincy, Ill.
- \*Euclid Crane & Hoist Co., Euclid, O.
- LaPlant-Choute Mfg. Co., Cedar Rapids, Iowa
- Smith Trailer Co., Syracuse, N. Y.
- Trail-IT Co., St. Paul, Minn.

## DYNAMITE (See Explosives)

## EARTH BORING EQUIPMENT

- \*Highway Trailer Co., Edgerton, Wis.

## EJECTORS, SEWAGE (See Sewage Ejectors)

## ELECTRIC GENERATORS AND MOTORS

- American Motors Co., Cedarburg, Wis.
- The Louis Allis Co., Milwaukee
- Allis-Chalmers Mfg. Co., Milwaukee
- Crocker-Wheeler Co., Ampere, N. J.
- Fairbanks, Morse & Co., Chicago
- General Electric Co., Schenectady, N. Y.
- Graybar Electric Co., New York
- Ideal Electric & Mfg. Co., Mansfield, O.
- Lincoln Electric Co., Cleveland, O.
- Northwestern Mfg. Co., Milwaukee, Wis.
- Robbins & Myers Co., Springfield, O.
- Wagner Electric Mfg. Co., St. Louis
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

## ELECTRIC LAMPS

- General Electric Co., Schenectady, N. Y.
- Westinghouse Lamp Co., N. Y.

## ELECTRIC LIGHTING PLANTS

- Allis-Chalmers Mfg. Co., Milwaukee
- Climax Eng. Co., Clinton, Ia.
- Cook Motor Co., Delaware, O.
- Cushman Motor Works, Lincoln, Neb.
- Fairbanks, Morse & Co., Chicago
- Fuller & Johnson Mfg. Co., Madison, Wis.
- General Electric Co., Schenectady, N. Y.
- Graybar Electric Co., New York
- Kohler Co., Kohler, Wis.
- Klauer Mfg. Co., Dubuque, Iowa
- Sunbeam Electric Mfg. Co., Evansville, Ind.
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

## ELECTRIC TRANSFORMERS

- Allis-Chalmers Mfg. Co., Milwaukee

- General Electric Co., Schenectady, N. Y.
- Kuhlman Electric Co., Bay City, Mich.
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

## ELECTRIC WIRES (See Wire)

## ELEVATORS, BUCKET

- \*Atlas Engineering Co., Clintonville, Wis.
- \*Austin-Western Rd. Mach. Co., Chicago
- \*Conveying Weigher Co., N. Y.
- \*Fairfield Engineering Co., Marion, Ohio
- \*Good Rds. Mach. Co., Kennett Sq., Pa.
- \*Geo. Haiss Mfg. Co., N. Y.
- \*Industrial Brownhoist Corp., Cleveland
- Abrams Cement Tool Co., Detroit
- Am. Mfg. Co., Chicago
- C. O. Bartlett & Snow Co., Cleveland, O.
- Chain Belt Co., Milwaukee, Wis.
- Gifford-Wood Co., Hudson, N. Y.
- Hendrick Mfg. Co., Carbondale, Pa.
- Jeffrey Mfg. Co., Columbus, O.
- Link-Belt Co., Chicago
- Littleford Bros., Cincinnati
- New Holland Mch. Co., N. Holland, Pa.
- Robins Convertible Belting Co., N. Y.
- Spears-Wells Mach. Co., Oakland, Cal.
- Stephens-Adams Mfg. Co., Aurora, Ill.
- Univ. Rd. Mach. Co., Kingston, N. Y.
- Webster Mfg. Co., Chicago
- Weller Mfg. Co., Chicago
- Worthington Pump & Mch. Corp., N. Y.

## ELEVATORS, PASSENGER, FREIGHT, ETC.

- Am. Elev. & Mach. Co., Louisville, Ky.
- Atlantic Elev. Co., Inc., Philadelphia
- Bay State Elev. Co., Springfield, Mass.
- Haughton Elev. & Mach. Co., Toledo, O.
- Leavellyn Ir. Wks., Los Angeles, Cal.
- Montgomery Elevator Co., Moline, Ill.
- Otis Elevator Co., N. Y.
- O. Ridgway & Son Co., Coatesville, Pa.
- A. B. See Electric Elevator Co., N. Y.
- Spindel Elevator Corp., Reading, Pa.
- Warner Elevator Mfg. Co., Cincinnati
- Warsaw Elevator Co., Warsaw, N. Y.
- Westinghouse Elec. Elevator Co., E. Pittsburgh, Pa.

## ENGINES, DREDGING

- Murray Iron Works Co., Burlington, Ia.

## ENGINES, GAS AND GASOLINE

- \*Caterpillar Tractor Co., San Leandro, Cal.
- \*Continental Motors Corp., Muskegon, Mich.
- \*Domestic Eng. & Pump Co., Shippensburg, Pa.
- \*Electric Wheel Co., Quincy, Ill.
- \*Hercules Motors Corp., Canton, O.
- \*John Lauson Mfg. Co., New Holstein, Wis.
- \*Le Roi Co., Milwaukee
- \*Novo Engine Co., Lansing, Mich.
- \*Sanderson-Cyclone Drill Co., Orrville, O.
- \*Stover Mfg. & Eng. Co., Freeport, Ill.
- \*Waukesha Motor Co., Waukesha, Wis.
- Alamo Engine Co., Hillsdale, Mich.
- Allis-Chalmers Mfg. Co., Milwaukee
- Beaver Mfg. Co., Milwaukee, Wis.
- Buda Co., Harvey, Ill.
- Charter Gas Engine Co., Sterling, Ill.
- Chicago Pneumatic Tool Co., N. Y.
- Climax Engineering Co., Clinton, Ia.
- Cook Motor Co., Delaware, O.
- Cushman Motor Works, Lincoln, Neb.
- Erted Mfg. Co., Portland, Ore.
- Evinrude Motor Co., Milwaukee
- Fairbanks Morse & Co., Chicago
- Foss Gas Engine Co., Springfield, O.
- Fuller & Johnson Mfg. Co., Madison, Wis.
- Hinkley Motors, Inc., Detroit
- F. Van Rossum Hoogendyk, New York
- Ingersoll-Rand Co., New York
- Minneapolis Steel & Machinery Co., Minneapolis, Minn.
- Servel Mfg. Co., Evansville, Ind.
- Sterling Engine Co., Buffalo, N. Y.
- Universal Motor Co., Oshkosh, Wis.
- Weber Engine Co., Kansas City, Mo.
- Wisconsin Motor Mfg. Co., Milwaukee
- Witte Engine Works, Kansas City, Mo.
- Worthington Pump & Mch. Corp., N. Y.

## ENGINES, HOISTING (See Hoists)

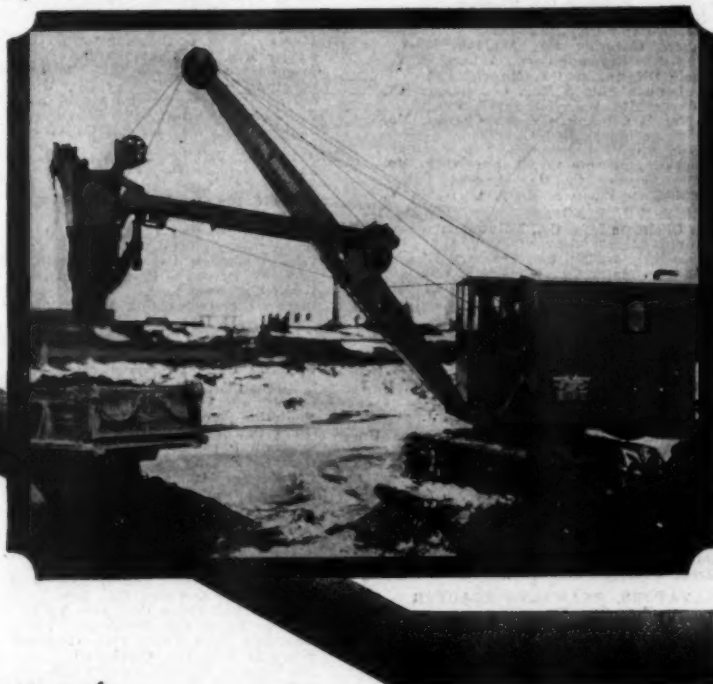
## ENGINES, INDUSTRIAL (See Power Plants, Industrial)

## ENGINES, KEROSENE

- \*Electric Wheel Co., Quincy, Ill.
- \*Hercules Motors Corp., Canton, O.
- \*John Lauson Mfg. Co., New Holstein, Wis.
- \*Stover Mfg. & Eng. Co., Freeport, Ill.
- \*Waukesha Motor Co., Waukesha, Wis.
- Alamo Engine Co., Hillsdale, Mich.
- Climax Engineering Co., Clinton, Ia.
- Fuller & Johnson Mfg. Co., Madison, Wis.
- Witte Engine Works, Kansas City, Mo.

# "Perfect Performance ~ ~ ~ ~ ~ ~ ~ Through 18 Inches of Frost"

*With over 16,000 cranes and shovels in the field... over a half century experience building quality handling machinery... and three large plants devoted to this purpose, Industrial Brownhoist offers you maximum returns on material handling investments.*



**W**m. McCormick, contractor of Youngstown, Ohio, writes "I am well pleased with my  $\frac{1}{2}$ -yard Industrial Brownhoist shovel crane. Both as a shovel and a crane it answers the purpose of my business admirably."

He continues, "This winter I used my  $\frac{1}{2}$ -yard shovel for grading, and it performed perfectly in spite of there being from twelve to eighteen inches of frost in the ground at times. Last fall I used the machine as a crane for unloading slag from railroad cars, and experienced no difficulty in unloading a car an hour."

The successful shovel crane performance that this owner has enjoyed, is accountable to Industrial Brownhoist's

ability to supply a quality machine of just the right type and size.

Whatever your particular job may be...excavating...grading...loading or unloading bulk materials, you too, can expect perfect performance with an Industrial Brownhoist on the job. Act today...increase your earnings by decreasing your handling costs with one of these convertible shovel cranes. They come in sizes ranging from  $\frac{1}{8}$  to  $1\frac{1}{4}$  yd. dipper, and 6 to 15 tons crane capacity. A choice of gas, steam, electric or diesel power may be had.

Just drop a line to our nearest representative, he will gladly call.

Industrial Brownhoist Corporation, General Offices, Cleveland, Ohio

District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, New Orleans, San Francisco.

Plants: Brownhoist Division, Cleveland; Industrial Division, Bay City, Michigan; Elyria Foundry Division, Elyria, Ohio.

# INDUSTRIAL BROWNHOIST



# Where to Purchase

## ENGINES, OIL, DIESEL

\*Allis-Chalmers Mfg. Co., Milwaukee  
 \*Stover Mfg. & Eng. Co., Freeport, Ill.  
 Anderson Engine & Fdry. Co., Anderson, Ind.  
 Beasmer Gas Eng. Co., Grove City, Pa.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Buckeye Machinery Co., Lima, O.  
 Busch Sulzer Bros.-Diesel Eng. Co., St. Louis  
 Charter Gas Engineering Co., Sterling, Ill.  
 Chicago Pneumatic Tool Co., New York  
 De La Vergne Machinery Co., New York  
 Fairbanks, Morse & Co., Chicago  
 Fulton Iron Works Co., St. Louis  
 Ingersoll-Rand Co., New York  
 Lombard Governor Co., Ashland, Mass.  
 McIntosh & Seymour Corp., Auburn, N. Y.  
 Muncie Oil Engine Co., Muncie, Ind.  
 New London Ship & Eng. Co., Groton, Ct.  
 Nordberg Mfg. Co., Milwaukee, Wis.  
 St. Mary's Oil Eng. Co., St. Charles, Mo.  
 Taylor Machinery Co., Cleveland, O.  
 F. Van Rossum Hoogenhout, New York  
 Weber Engineering Co., Kansas City, Mo.  
 Western Machy. Co., Los Angeles, Cal.  
 Worthington Pump & Mch. Corp., N. Y.

## ENGINES, PUMPING

\*Allis-Chalmers Mfg. Co., Milwaukee  
 \*Hercules Motors Corp., Canton, O.  
 \*Stover Mfg. & Eng. Co., Freeport, Ill.  
 \*Waukesha Motor Co., Waukesha, Wis.  
 Climax Engineering Co., Clinton, Ia.  
 Hooven, Owens, Rentschler Co., Hamilton, O.  
 Murray Iron Works, Burlington, Ia.  
 Nordberg Mfg. Co., Milwaukee  
 Worthington Pump & Mch. Corp., N. Y.

## ENGINES, SWINGING

\*J. S. Mundy Htg. Engine Co., Newark, N. J.  
 Dake Engine Co., Grand Haven, Mich.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.

## EXCAVATING MACHINERY (See Names Under Excavators, also Steam Shovels)

### EXCAVATORS, CABLEWAY

\*Beaumont Mfg. Co., Philadelphia  
 \*Basserman Bros., Inc., Chicago  
 \*Scheldt-Burkett Constr. Co., Macon, Ga.  
 Ersted Mfg. Co., Portland, Ore.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Link-Belt Co., Chicago  
 Street Bros. Machinery Works, Chattanooga

### EXCAVATORS, CRAWLING TRACTOR

\*Bucyrus-Erie Co., Erie, Pa.  
 \*Geo. Hais Mfg. Co., New York  
 \*Trackson Co., Milwaukee, Wis.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Osgood Company, Marion, Ohio  
 W. M. Blair Mfg. Co., Chicago, Ill.  
 Byers Machine Co., Ravenna, O.  
 General Excavator Co., Marion, Ohio

### EXCAVATORS, DITCH AND TRENCH

\*Barber-Greene Co., Aurora, Ill.  
 \*Bay City Shovel, Inc., Bay City, Mich.  
 \*Bucyrus-Erie Co., Erie, Pa.  
 \*Geo. Hais Mfg. Co., New York  
 \*Hayward Co., New York  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Inaley Mfg. Co., Indianapolis, Ind.  
 \*Manitowoc Engr. Wks., Manitowoc, Wis.  
 \*Osgood Company, Marion, Ohio  
 \*Parsons Co., Newton, Ia.  
 \*The Shovel Co., Lorain, O.

Austin Mach. Corp., Muskegon, Mich.  
 Buckeye Tractor Ditcher Co., Findlay, O.  
 Byers Machine Co., Ravenna, O.  
 Cleveland Trencher Co., Euclid, O.  
 Economy Exc. Co., Iowa Falls, Ia.  
 Ersted Mfg. Co., Portland, Ore.  
 General Excavator Co., Marion, Ohio  
 Keystone Driller Co., Beaver Falls, Pa.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Link-Belt Co., Chicago  
 Marion Steam Shovel Co., Marion, O.  
 Monaghan Machinery Co., Chicago  
 Ohio Power Shovel Co., Lima, Ohio  
 Orton Crane & Shovel Co., Chicago  
 Owensboro Ditcher & Grader Co., Owensboro, Ky.  
 Speeder Mch. Corp., Cedar Rapids, Ia.  
 Star Drilling Machinery Co., Akron, O.  
 Street Bros. Machine Works, Chattanooga  
 C. T. Topping Machinery Co., Dayton, O.

### EXCAVATORS, DRAG-LINE

\*Bay City Shovel, Inc., Bay City, Mich.  
 \*Beaumont Mfg. Co., Philadelphia  
 \*Bucyrus-Erie Co., Erie, Pa.  
 \*L. F. Green, Chicago  
 \*Hayward Co., New York  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Kochring Co., Milwaukee  
 \*Manitowoc Engr. Wks., Manitowoc, Wis.  
 \*Osgood Company, Marion, Ohio  
 \*Basserman Bros., Chicago  
 \*Scheldt-Burkett Constr. Co., Macon, Ga.  
 \*The Shovel Co., Lorain, O.  
 Amer. Hoisting & Derrick Co., St. Paul  
 Austin Machy. Corp., Muskegon, Mich.  
 Byers Machine Co., Ravenna, O.  
 Economy Exc. Co., Iowa Falls, Ia.  
 Ersted Mfg. Co., Portland, Ore.  
 C. L. Gade, Iowa Falls, Ia.  
 General Excavator Co., Marion, Ohio

Gallon Iron Wks. & Mfg. Co., Gallon, O.  
 Harnischfeger Corp., Milwaukee, Wis.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Link-Belt Co., Chicago  
 Marion Steam Shovel Co., Marion, O.  
 Monaghan Machinery Co., Chicago  
 Ohio Power Shovel Co., Lima, O.  
 Orton Crane & Shovel Co., Chicago  
 Page Engineering Co., Chicago  
 Speeder Mch. Corp., Cedar Rapids, Ia.  
 Star Drilling Machine Co., Akron, O.  
 Street Bros. Machine Works, Chattanooga

## EXPANDED METAL

\*Truscon Steel Co., Youngstown, O.  
 Berger Mfg. Co., Canton, Ohio  
 Consolidated Exp. Metal Co., Wheeling, W. Va.  
 Decatur Cornice & Roofing Co., Albany, Ala.  
 Northwestern Exp. Metal Co., Chicago  
 Wheeling Corrugating Co., Wheeling, W. Va.  
 Youngstown Pressed Steel Co., Warren, O.

## EXPANSION JOINT MATERIAL

\*Barber Asphalt Co., Philadelphia  
 \*Barrett Co., New York  
 \*Phillips Carey Co., Cincinnati, O.  
 \*W. R. Meadows, Inc., Elgin, Ill.  
 \*Truscon Steel Co., Youngstown, O.  
 Hoosier Asphalt Co., Alexandria, Ind.  
 Pioneer Asphalt Co., Lawrenceville, Ill.  
 Servised Products Corp., Chicago  
 Texas Co., New York  
 Waring-Underwood Co., Philadelphia

## EXPLOSIVES

Atlas Powder Co., Wilmington, Del.  
 Austin Powder Co., Cleveland, O.  
 Egyptian Powder Co., East Alton, Ill.  
 E. I. Du Pont De Nemours & Co., Wilmington, Del.  
 Equitable Powder Mfg. Co., E. Alton, Ill.  
 Giant Powder Co., San Francisco, Cal.  
 Grasselli Powder Co., Cleveland, O.  
 Hercules Powder Co., Wilmington, Del.  
 Ill. Powder Mfg. Co., St. Louis, Mo.  
 King Powder Co., Cincinnati, O.  
 Union Explosives Co., Clarksburg, W. Va.  
 U. S. Powder Co., Terre Haute, Ind.

## FENCING

\*American Steel & Wire Co., Chicago  
 Adrian Wire Fence Co., Adrian, Mich.  
 Amer. Fence & Const. Co., New York  
 Anchor Post Fence Co., New York  
 Cyclone Fence Co., Waukegan, Ill.  
 Duggins Wire Fence Co., Anderson, Ind.  
 Edwards Mfg. Co., Cincinnati  
 Ill. Wire & Mfg. Co., Joliet, Ill.  
 Ind. Steel & Wire Co., Muncie, Ind.  
 Interlocking Fence Co., Morton, Ill.  
 Keystone Steel & Wire Co., Peoria, Ill.  
 Kokomo Steel & Wire Co., Kokomo, Ind.  
 Mich. Wire Fence Co., Adrian, Mich.  
 Nitselman Bros., Muncie, Ind.  
 Page Stil. & Wire Prod. Corp., Bridgeport, Ct.  
 Pittsburgh Steel Co., Pittsburgh, Pa.  
 Stewart Ir. Wks. Co., Cincinnati, O.  
 Tex. Cyclone Fence Co., Ft. Worth, Tex.  
 Van Dorn Iron Works Co., Cleveland, O.  
 Wayne Iron Works, Wayne, Pa.  
 Wickwire-Spencer Steel Co., New York

## FILING EQUIPMENT, STEEL

Art Metal Constr. Co., Jamestown, N. Y.  
 Berger Mfg. Co., Canton, O.  
 Canton Art Metal Co., Canton  
 Gen. Fireproofing Co., Youngstown, O.  
 Van Dorn Iron Works Co., Cleveland, O.

## FILTERS, OIL

S. F. Bowser & Co., Inc., Ft. Wayne, Ind.

## FILTERS, WATER

Amer. Water Softener Co., Philadelphia, Pa.  
 Cochran Corp., Philadelphia, Pa.  
 Graver Corporation, E. Chicago, Ind.  
 International Filter Co., Chicago  
 Norwood Engineering Co., Florence, Mass.  
 Roberts Filter Co., Darby, Pa.  
 W. B. Seafie & Sons, Pittsburgh, Pa.

## FINISHING MACHINES, CONCRETE ROAD (See Concrete Road Finishers)

## FIRE & POLICE ALARM SYSTEMS

Eagle Signal Sales Corp., Moline, Ill.  
 Gamewell Co., Newton Upper Falls, Mass.  
 Sterling Siren Fire Alarm Co., Rochester, N. Y.

## FIRE ALARM SIRENS

Erick Electric Siren Co., St. Paul, Minn.  
 Federal Sign System, Chicago  
 Hendrie & Bolthoff Mfg. & Sup. Co., Denver, Colo.  
 Holtzer-Cabot Electric Co., Boston  
 Sterling Siren Fire Alarm Co., Rochester, N. Y.  
 Union Water Meter Co., Worcester, Mass.

## FIRE APPARATUS, MOTOR

Ahrens-Fox Fire Eng. Co., Cincinnati, Ohio  
 Amer-La France & Foamite Corp., New York  
 Boyer Fire Apparatus Co., Logansport, Ind.  
 Brockway Motor Fire Apparatus Co., Cortlandt, N. Y.  
 Buffalo Fire Appl. Corp., Buffalo, N. Y.

Hale Fire Pump Co., Conshohocken, Pa.  
 Mack Trucks, Inc., New York  
 Northern Fire Apparatus Co., Minneapolis, Minn.  
 Peter Pirsch & Sons Co., Kenosha, Wis.  
 Prospect Fire Engine Co., Prospect, Ohio  
 Seagrave Co., Columbus, Ohio  
 Waterson Fire Eng. Works, St. Paul, Minn.  
 White Co., Cleveland

## FIRE HOSE (See Hose, Fire)

## FLEXIBLE JOINTS

\*Central Foundry Co., New York  
 \*U. S. Pipe & Fdry. Co., Burlington, N. J.  
 Coldwell-Wilcox Co., Newburgh, N. Y.  
 Crane Co., Chicago  
 United Lead Company, New York

## FLOOD LIGHTING PROJECTORS

B. B. T. Corp., Philadelphia, Pa.  
 Crouse-Hinds Co., Syracuse, N. Y.  
 General Electric Co., Schenectady  
 Sperry Gyroscope Co., Brooklyn, N. Y.

## FLOOD LIGHTS, PORTABLE

\*National Carbide Sales Corp., New York  
 \*Oxwell Acetylene Co., New York  
 General Electric Co., Schenectady, N. Y.  
 Kohler Co., Kohler, Wis.  
 Alexander Milburn Co., Baltimore  
 Westinghouse El. & Mfg. Co., E. Pittsburgh, Pa.

## FLOORING, COMPOSITION

\*Barber Asphalt Co., Philadelphia  
 \*Barrett Co., New York  
 Am. Mason Safety Tr. Co., Lowell, Mass.  
 Johns-Manville, Inc., New York  
 Marine Decking & Sup. Co., Philadelphia, Pa.  
 Franklin R. Muller & Co., Waukegan, Ill.

## FLOORS, WOOD BLOCK

\*Barrett Co., New York  
 Carter Bloxend Flooring Co., Kansas City, Mo.  
 Jennison-Wright Co., Toledo, Ohio  
 Midland Cres. Co., Toledo, Ohio  
 Republic Cres. Co., Indianapolis, Ind.  
 Sou. Wood Preserving Co., Atlanta, Ga.  
 Wyckoff Pipe & Cres. Co., New York

## FLUSH TANKS

Pacific Flush Tank Co., Chicago and N. Y.

## FLUSHERS, STREET (See Street Flushers and Sprinklers)

## FORGES, OIL (Rivet Heating)

Hauck Mfg. Co., Brooklyn, N. Y.  
 Mead-Morrison Mfg. Co., E. Boston

## FORMS, CONCRETE ROAD

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Holtel Stil. Form & Ir. Co., Warren, Ohio  
 \*Lakewood Engr. Co., Cleveland, Ohio  
 \*Truscon Steel Co., Youngstown, Ohio  
 Hotchkiss Stil. Products Co., Binghamton, N. Y.  
 Metal Forms Corp., Milwaukee

## FORMS, CONCRETE PIPE

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Holtel Stil. Form & Ir. Co., Warren, O.  
 Concrete Form Co., Syracuse, N. Y.  
 Eclipse Mach. Co., Kendallville, Ind.  
 Martin Iron Works, Los Angeles, Cal.  
 Quinn Wire & Iron Works, Boone, Iowa

## FORMS, MANHOLE, PIPE, SEWER, ETC.

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Holtel Stil. Form & Ir. Co., Warren, Ohio

## FORMHEADERS

Ted Carr & Co., Chicago

## FOUNTAINS, DRINKING

Jas. B. Clow & Sons, Chicago  
 Crane Co., Chicago  
 Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
 Murdoch Mfg. & Sup. Co., Cincinnati  
 Puro San. Dr. Fin. Co., Haydenville, Mass.  
 Rundle-Spence Mfg. Co., Milwaukee  
 Stewart Iron Works Co., Cincinnati, Ohio  
 Halsey W. Taylor Co., Warren, Ohio  
 Century Brass Works, Belleville, Ill.

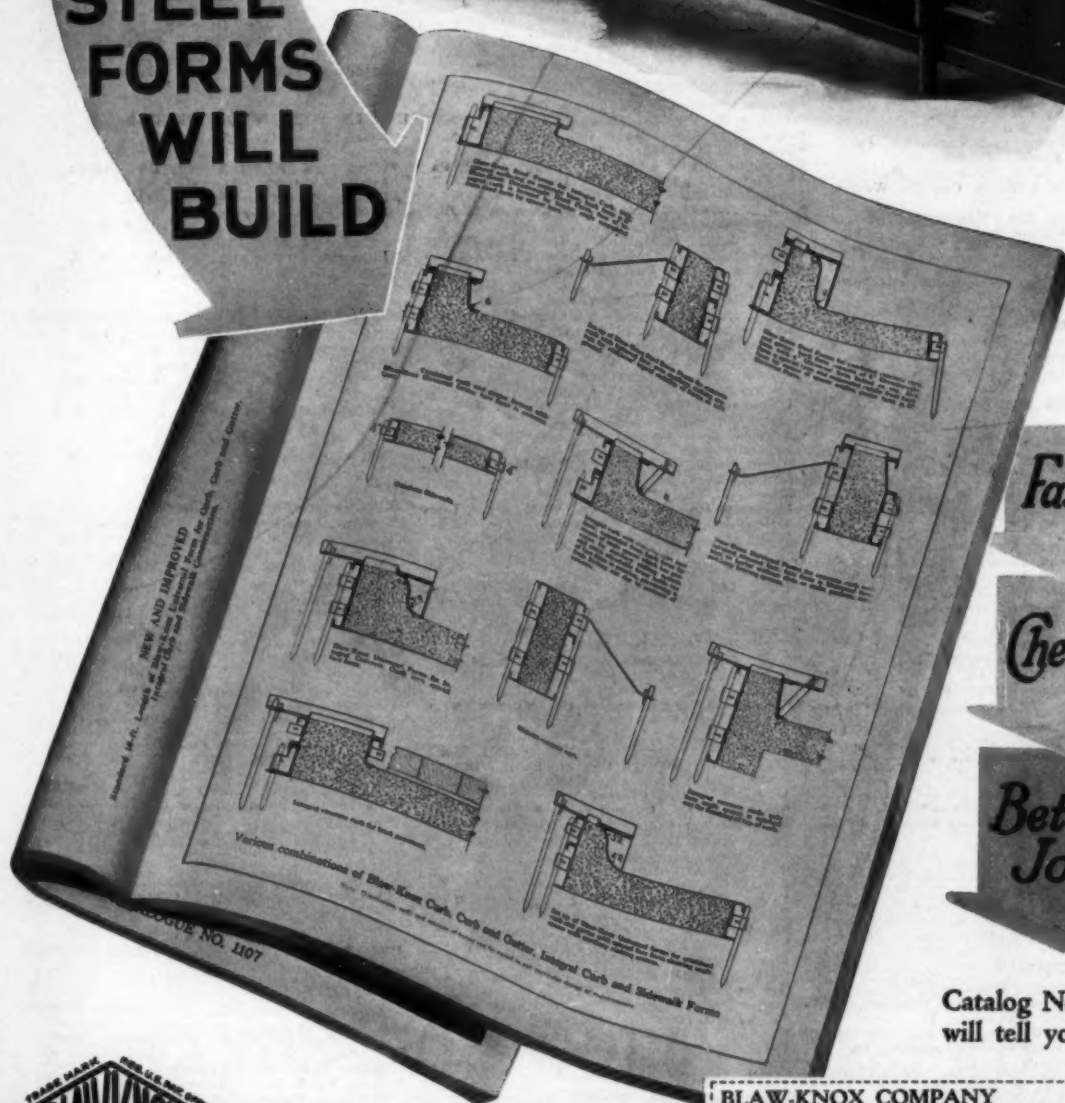
## FRESHOES (See Scrapers, Rotary)

## GAGES, WATER LEVEL

Bristol Co., Waterbury, Conn.  
 Builders Iron Foundry, Providence, R. I.  
 W. & L. E. Gurley, Troy, N. Y.  
 Lankenheimer Co., Cincinnati, Ohio  
 Simplex Valve & Meter Co., Phila.  
 Walworth Mfg. Co., Boston

**A  
SET OF  
BLAW-KNOX  
STEEL  
FORMS  
WILL  
BUILD**

*—too much money is wasted  
on Wood Forms*



*Faster*

*Cheaper*

*Better  
Jobs*

Catalog No. 1107  
will tell you how



**BLAW-K**

**BLAW-KNOX COMPANY**

67 Farmers Bank Bldg. Pittsburgh, Pa.

Send me a copy of your Bulletin No. 1107  
—Blaw-Knox Street and Sidewalk Forms.

NAME

COMPANY

STREET

CITY

STATE

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

# Where to Purchase

## GARBAGE CANS (See Cans)

## GARBAGE COLLECTION EQUIPMENT

\*Highway Trailer Co., Edgerton, Wis.  
 Atlas Sales Corp., New York City  
 Detroit Trailer & Mach. Co., Detroit  
 Freuhant Trailer Co., Detroit, Mich.  
 Hell Co., Milwaukee  
 Geo. H. Holsbrog & Bros., Jeffersonville, Ind.  
 Lee Trailer & Body Co., Plymouth, Ind.  
 Littleford Bros., Cincinnati  
 B. Nicoll & Co., New York  
 Smith Trailer Co., Syracuse, N. Y.  
 Troy Trailer & Wagon Co., Troy, Ohio

## GARBAGE DISPOSAL SYSTEMS

American Beccart Corp., New York  
 C. O. Bartlett & Snow Co., Cincinnati  
 Decarie Incinerator Co., L. I. City, N. Y.  
 Guder Incinerator Corp., Chicago  
 Hiller Eng. & Const. Co., Brooklyn, N. Y.  
 Morse-Boulger Destructor Co., New York  
 Nye Odorless Crematory Co., Macon, Ga.  
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
 Superior Incinerator Co. of Dallas, Dallas, Tex.

## GASOLINE STORAGE TANKS

Biggs Boiler Works, Akron, Ohio  
 Birmingham Tank Co., Birmingham, Ala.  
 S. F. Bowser & Co., Inc., Ft. Wayne, Ind.  
 Chicago Bridge & Iron Works, Chicago  
 Graver Corp., East Chicago, Ind.  
 Hell Co., Milwaukee, Wis.  
 Lancaster Iron Works, Inc., Lancaster, Pa.  
 Littleford Bros., Cincinnati, Ohio  
 Wm. B. Seale & Sons, Pittsburgh, Pa.  
 Tekheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
 United Iron Works, Inc., Kansas City, Mo.  
 Wayne Co., Fort Wayne, Ind.

## GATES, SLUICE

Chapman Valve Mfg. Co., Indian Orchard, Mass.  
 Coffin Valve Co., Boston, Mass.  
 Coldwell-Wilcox Co., Newburgh, N. Y.  
 R. Hardesty Mfg. Co., Denver  
 Rodney Hunt Machine Co., Orange, Mass.  
 Ludlow Valve Mfg. Co., Troy, N. Y.

## GATES FOR PARKS AND CEMETERIES

Stewart Iron Works Co., Cincinnati, Ohio  
 Wayne Iron Works, Wayne, Pa.

## GLASS, FIREPROOF (See Wire Glass)

## GRADERS, ROAD (See Road Graders)

## GRADER BLADES

\*General Wheelbarrow Co., Cleveland, O.  
 J. D. Adams & Co., Indianapolis, Ind.  
 Gallon Ir. Works & Mfg. Co., Gallon, Ohio  
 Russell Grader Mfg. Co., Minneapolis  
 Shunk Mfg. Co., Bucyrus, Ohio

## GRAND STANDS, PORTABLE

Circle-A Prod. Corp., Newcastle, Ind.  
 Leavitt Mfg. Co., Urbana, Ill.  
 Wayne Iron Works, Wayne, Pa.

## GRATING, STEEL

\*Blaw-Knox Co., Pittsburgh  
 Hendrick Mfg. Co., Carbondale, Pa.

## GREASE

\*D-A Lubricant Co., Inc., Indianapolis  
 \*Jos. Dixon Crucible Co., Jersey City, N. J.

## GRIEZLIES

Allis-Chalmers Mfg. Co., Milwaukee  
 Austin Mfg. Co., Chicago  
 Robins Conv. Belt Co., New York  
 Smith Engineering Works, Milwaukee  
 Stephens-Adamson Mfg. Co., Angola, Ill.

## GUARD RAIL, HIGHWAY

\*Am. Steel & Wire Co., Chicago  
 \*Williamsport Wire Rope Co., Williamsport, Pa.  
 Cyclone Fence Co., Waukegan, Ill.  
 W. S. Godwin Co., Baltimore, Md.  
 Hazard Wire Rope Co., Wilkesbarre, Pa.  
 J. H. Ramsey, Albany, N. Y.  
 W. F. Robertson Stl. & Iron Co., Cincinnati  
 Stewart Iron Works Co., Cincinnati  
 Wickwire-Spencer Steel Co., New York

## HAMMERS, STEAM, PILE (See Pile Hammers, Steam)

## HEATING KETTLES (See Kettles)

## HITCHES

\*Gustav Schaefer Co., Cleveland, Ohio  
 Detroit Trailer & Machine Co., Detroit  
 Trail-IT Co., St. Paul, Minn.  
 Whitehead & Kales Co., Detroit

## HOISTS, BELT-DRIVEN

\*Amer. Saw Mill Mch. Co., Hackettstown, N. J.  
 \*Brown Clutch Co., Sandusky, Ohio  
 \*Dobbie Fdry. & Mach. Co., Niagara Falls  
 \*Domestic Engine & Pump Co., Shippensburg, Pa.  
 \*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
 American Hoist & Derrick Co., St. Paul, Minn.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Mead-Morrison Mfg. Co., Boston, Mass.  
 Street Bros. Mach. Works, Chattanooga  
 Universal Hoist & Mfg. Co., Cedar Falls, Ia.  
 Weller Mfg. Co., Chicago  
 William Hoist Co., Los Angeles, Calif.

## HOISTS, CONCRETE, TOWER

\*Brown Clutch Co., Sandusky, Ohio  
 \*C. H. & E. Mfg. Co., Milwaukee, Wis.  
 \*Domestic Eng. & Pump Co., Shippensburg, Pa.  
 \*Insley Mfg. Co., Indianapolis, Ind.  
 \*Lakewood Eng. Co., Cleveland, Ohio  
 \*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
 \*Nove Engine Co., Lansing, Mich.  
 \*Ransome Conc. Mch. Co., Danellen, N. J.  
 English Bros. Mach. Co., Kansas City  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Mead-Morrison Mfg. Co., Boston  
 Street Bros. Mach. Works, Chattanooga

## HOISTS, ELECTRIC

\*Brown Clutch Co., Sandusky, Ohio  
 \*C. H. & E. Mfg. Co., Milwaukee, Wis.  
 \*Clyde Iron Works Sales Co., Duluth, Minn.  
 \*Dobbie Fdry. & Mach. Co., Niagara Falls  
 \*Domestic Engine & Pump Co., Shippensburg, Pa.  
 \*S. Flory Mfg. Co., Bangor, Pa.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
 \*Nove Engine Co., Lansing, Mich.  
 \*O. K. Clutch & Mach. Co., Columbia, Pa.  
 \*Sterling Machinery Corp., Kansas City, Mo.  
 \*Sullivan Machy. Co., Chicago  
 Am. Hoist & Derrick Co., St. Paul, Minn.  
 Chisholm-Moore Co., Cleveland, Ohio  
 Construction Machy. Co., Waterloo, Ia.  
 Deke Eng. Co., Grand Haven, Mich.  
 Norris K. Davis San Francisco, Calif.  
 English Bros. Machy. Co., Kansas City, Mo.  
 Ersted Mfg. Co., Portland, Ore.  
 Harnischfeger Corp., Milwaukee  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Mead-Morrison Mfg. Co., Boston  
 National Hoisting Eng. Co., Harrison, N. J.  
 Northern Engineering Works, Detroit  
 Street Bros. Mach. Works, Chattanooga  
 Thomas Elevator Co., Chicago  
 Treadwell Engineering Co., Easton, Pa.  
 Universal Hoist & Mfg. Co., Cedar Falls, Iowa  
 Vulcan Iron Works, Wilkes-Barre, Pa.  
 Williams Hoist Co., Los Angeles, Calif.

## HOISTS, GASOLINE

\*Amer. Cement Mach. Co., Inc., Keokuk, Iowa  
 \*Amer. Saw Mill Mch. Co., Hackettstown, N. J.  
 \*Brown Clutch Co., Sandusky, Ohio  
 \*C. H. & E. Mfg. Co., Milwaukee  
 \*Clyde Iron Works Sales Co., Duluth, Minn.  
 \*Domestic Engine & Pump Co., Shippensburg, Pa.  
 \*S. Flory Mfg. Co., Bangor, Pa.  
 \*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
 \*Nove Engine Co., Lansing, Mich.  
 \*O. K. Clutch & Mach. Co., Columbia, Pa.  
 \*Sterling Machinery Corp., Kansas City, Mo.  
 Am. Hoist & Derrick Co., St. Paul, Minn.  
 Amer. Mfg. & Eng. Co., Kalamazoo, Mich.  
 Austin Mfg. Co., Chicago  
 Beach Mfg. Co., Charlotte, Mich.  
 Buffalo Hoist & Derrick Co., Buffalo, N. Y.  
 Construction Machy. Co., Waterloo, Ia.  
 Deke Eng. Co., Grand Haven, Mich.  
 Dyrr Mfg. Co., Huntington Park, Calif.  
 Norris K. Davis San Francisco, Calif.  
 English Bros. Machy. Co., Kansas City, Mo.  
 Ersted Mfg. Co., Portland, Ore.  
 Lansing Co., Lansing, Mich.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Mead-Morrison Mfg. Co., Boston  
 National Hoisting Eng. Co., Harrison, N. J.  
 Orr & Sombower, Reading, Pa.  
 Street Bros. Mach. Works, Chattanooga  
 Thomas Elevator Co., Chicago  
 Universal Hoist & Mfg. Co., Cedar Falls, Iowa  
 Williams Hoist Co., Los Angeles, Calif.

## HOISTS, HAND

\*Beebe Bros., Inc., Seattle, Wash.  
 \*Dobbie Fdry. & Machine Co., Buffalo, N. Y.

## HOISTS, PNEUMATIC

\*Independent Pneu. Tool Co., Chicago, Ill.  
 \*Sullivan Machy. Co., Chicago  
 Chicago Pneumatic Tool Co., New York  
 Curtis Pneumatic Mch. Co., St. Louis  
 Deke Eng. Co., Grand Haven, Mich.  
 Detroit Hoist & Mach. Co., Detroit  
 Gardner-Denver Co., Quincy, Ill.  
 Gilman Mfg. Co., E. Boston, Mass.  
 Hanna Engineering Works, Chicago

Ingersoll-Rand Co., New York  
 Mead-Morrison Mfg. Co., Boston  
 Northern Eng. Works, Detroit, Mich.  
 Worthington Pump & Mch. Corp., N. Y.

## HOISTS, PORTABLE

\*Beebe Bros., Inc., Seattle, Wash.  
 \*Brown Clutch Co., Sandusky, Ohio  
 \*C. H. & E. Mfg. Co., Milwaukee, Wis.  
 Ersted Mfg. Co., Portland, Ore.  
 Joliet Mfg. Co., Joliet, Ill.  
 Jas. B. Seaverns Co., Batavia, Ill.

## HOISTS, STEAM

\*Clyde Iron Works Sales Co., Duluth, Minn.  
 \*S. Flory Mfg. Co., Bangor, Pa.  
 \*J. S. Mundy Hstg. Engine Co., Newark, N. J.  
 \*Sullivan Machinery Co., Chicago  
 Am. Hoist & Derrick Co., St. Paul, Minn.  
 Deke Eng. Co., Grand Haven, Mich.  
 Hardie-Tynes Mfg. Co., Birmingham, Ala.  
 Ingersoll-Rand Co., New York  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Mead-Morrison Mfg. Co., Boston  
 National Hoisting Eng. Co., Harrison, N. J.  
 Orr & Sombower, Reading, Pa.  
 Street Bros. Mach. Works, Chattanooga  
 Thomas Elevator Co., Chicago  
 Treadwell Engineering Co., Easton, Pa.

## HOISTS FOR MOTOR TRUCKS

\*Beebe Bros., Inc., Seattle, Wash.  
 \*Brown Clutch Co., Sandusky, Ohio  
 \*Wood Hydr. Hoist & Body Co., Detroit  
 Atlas Sales Corp., New York  
 Ersted Mfg. Co., Portland, Ore.  
 Hell Co., Milwaukee  
 Hydr. Hoist Mfg. Co., St. Paul, Minn.  
 Joliet Mfg. Co., Joliet, Ill.  
 Lidgerwood Mfg. Co., Elizabeth, N. J.  
 Van Dorn Iron Works Co., Cleveland, Ohio

## HOPPERS, CONCRETE (Aggregate Measuring)

\*Blaw-Knox Company, Pittsburgh, Pa.  
 \*Butler Bin Co., Waukesha, Wis.  
 \*Erie Steel Const'n Co., Erie, Pa.  
 \*Helsel Stl. Form & Ir. Co., Warren, Ohio  
 \*Lakewood Eng. Co., Cleveland, Ohio  
 \*Ransome Conc. Mch. Co., Danellen, N. J.  
 O. S. Johnson Co., Champaign, Ill.  
 Jas. B. Seaverns Co., Batavia, Ill.  
 Superior Engineering Co., Warren, Ohio

## HOSE, AIR

\*The Buhl Company, Chicago  
 \*Independent Pneu. Tool Co., Chicago  
 Chicago Pneumatic Tool Co., New York  
 Cincinnati Rubber Mfg. Co., Cincinnati  
 Cleveland Rock Drill Co., Cleveland, Ohio  
 The Dallett Co., Philadelphia, Pa.  
 Gilman Mfg. Co., East Boston, Mass.  
 Goodyear Tire & Rubber Co., Akron, Ohio  
 Ingersoll-Rand Co., New York  
 Mulconroy Co., Inc., Philadelphia, Pa.  
 Penna. Flexible Metallic Tubing Co., Phila., Pa.  
 Republic Rubber Co., Youngstown, Ohio  
 United States Rubber Co., New York

## HOSE, FIRE

Bi-Lateral Fire Hose Co., Chicago  
 Eureka Fire Hose Mfg. Co., New York  
 Fabric Fire Hose Co., New York  
 B. F. Goodrich Rubber Co., Akron, Ohio  
 Goodyear Tire & Rubber Co., Akron, Ohio

## HOUSE NUMBERS

Hamilton Metal Prod. Co., Hamilton, Ohio  
 O. H. Hanson Co., Chicago  
 Niagara Metal Stamping Corp., Niagara Falls, N. Y.

## HOUSES, PORTABLE (See Portable Buildings)

## HYDRANTS, FIRE

Chapman Valve Mfg. Co., Indian Orchard, Mass.  
 Columbian Ir. Works, Chattanooga, Tenn.  
 Darling Valve & Mfg. Co., Williamsport, Pa.  
 Eddy Valve Co., Watertown, N. Y.  
 Iowa Valve Co., Oskaloosa, Iowa  
 Kennedy Valve Mfg. Co., Elmira, N. Y.  
 Ludlow Valve Mfg. Co., Troy, N. Y.  
 Michigan Valve & Fdry. Co., Detroit  
 Norwood Eng. Co., Florence, Mass.  
 Rensselaer Valve Co., Troy, N. Y.  
 A. P. Smith Mfg. Co., E. Orange, N. J.  
 Vogt Bros. Mfg. Co., Louisville, Ky.  
 Watrous Co., St. Paul  
 R. D. Wood & Co., Philadelphia, Pa.

## HYDRAULIC RAMS

Deming Co., Salem, Ohio

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



# CLYDE

## HOISTS - DERRICKS

*- ten thousand strong -*

Proof positive that Clyde hoists and derricks are continually winning more friends and users every day - as well as maintaining their old ones. Such a record, as indicated by the constant repeat orders, is the result of producing equipment that embodies all the best qualities necessary for efficient and lasting service.

*In the illustration below is shown a Clyde steam hoist driving piles for Whitney Bros. on a new filtration plant for the City of Detroit. Two Clyde hoists are used on this job, driving around fifteen thousand piles, eighty feet long.*



## CLYDE IRON WORKS SALES CO.

DISTRIBUTORS FOR CLYDE IRON WORKS DULUTH, MINNESOTA

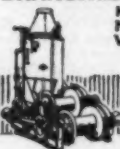
—BRANCHES—

NEW ORLEANS: 309 MAGAZINE ST.  
 PORTLAND, OREGON: 555 THURMAN ST.  
 SEATTLE: 3410 FIRST AVENUE SOUTH  
 CHICAGO: 11 SO. LASALLE STREET

MEMPHIS: 69 UNION AVENUE  
 NEW YORK: 856 EAST 136TH STREET  
 VANCOUVER, . . . . . BRITISH COLUMBIA  
 1325 STANDARD BANK BLDG.



TWO MARKS OF



GUARANTEED QUALITY



# Where to Purchase

Johnson Mfg. Co., Seattle, Wash.  
Rife Hydraulic Engine Co., New York  
Ramsey Pump Co., Seneca Falls, N. Y.

## IGNITION SYSTEMS

\*Hessmann Magneto Corp., New York  
American Bosch Magneto Corp., Springfield, Mass.  
Dayton Eng. Lab. Co., Dayton, Ohio  
Spittler Electric Co., Newark, N. J.

INCINERATORS, GARBAGE (See Garbage Disposals)

INDICATOR POSTS (See Valves)

## INSPECTING LABORATORIES

\*Conard & Busby, Burlington, N. J.  
\*Robert W. Hunt Co., Chicago, Ill.  
\*Fritz Testing Laboratories, Des Moines, Ia.  
Allentown Testing Laboratory, Allentown, Pa.  
E. L. Conwell & Co., Philadelphia, Pa.  
Gallik-Henderson Co., New York  
New York Testing Lab., New York  
Pittsburgh Testing Lab., Pittsburgh

INSTRUMENTS AND SUPPLIES (Surveyors' and Engineers')

Wm. Alanworth & Sons, Denver, Col.  
L. Beckman Co., Toledo, Ohio  
C. L. Berger & Sons, Boston  
Brandis & Sons Mfg. Co., Brooklyn, N. Y.  
Buff & Buff Mfg. Co., Boston  
Eugene Dietgen Co., Chicago  
W. & L. E. Gurley, Troy, N. Y.  
Kouff & Esser Co., Hoboken, N. J.  
Kolesch & Co., New York  
A. Lietz Co., San Francisco  
Leopold Volpel & Co., Portland, Ore.  
Lufkin Rule Co., Saginaw, Mich.  
Warren-Knight Co., Philadelphia, Pa.  
F. Weber & Co., Philadelphia, Pa.  
David White Co., Milwaukee, Wis.

INTEGRAL CURB AND BASE FORMS (See Forms, Concrete)

IRON WORK, STRUCTURAL AND ORNAMENTAL, (See Bridges and Buildings)

## JACKS, LIFTING

\*McKernan-Terry Drill Co., New York  
\*Templeton, Kenly & Co., Chicago  
Duff Mfg. Co., Pittsburgh, Pa.  
Joyce-Cridland Co., Dayton, Ohio  
A. O. Norton, Inc., Moline, Ill.  
Oil Jack Co., New York  
Rees Mfg. Co., Pittsburgh, Pa.  
Watson-Stillman Company, New York

## JACKS, PIPE FORGING

\*Templeton, Kenly & Co., Chicago  
Duff Mfg. Co., Pittsburgh, Pa.  
Easby Mfg. Co., Lincoln, Neb.

## JAIL AND PRISON WORK

Fries & Son Steel Const. & Eng. Co., Covington, Ky.  
Manly Jail Works, Dalton, Ga.  
Pearly Jail Building Co., St. Louis, Mo.  
Southern Prison Co., San Antonio, Tex.  
Stewart Iron Works Co., Cincinnati, Ohio  
Van Dorn Iron Works Co., Cleveland

JOINTS, EXPANSION PAVING (See Expansion Joint Material)

JOINTS, FLEXIBLE PIPE (See Flexible Joints)

## JOINTS, STEEL

\*Truscen Steel Co., Youngstown, Ohio  
Berger Mfg. Co., Canton, Ohio  
Gensire Steel Co., Youngstown, Ohio  
Ingalls Steel Prod. Co., Birmingham, Ala.

## KETTLES, FOR ASPHALT AND TAR

\*Barber Asphalt Co., Philadelphia, Pa.  
\*Chamsee Oil Burner Co., Elkhart, Ind.  
\*Connery & Co., Inc., Philadelphia, Pa.  
\*Good Roads Mch. Co., Kennett Square, Pa.  
\*Jos. Menhorst Co., Cincinnati, Ohio  
\*Union Iron Works, Inc., Hoboken, N. J.  
Ame Rd. Mach. Co., Frankfort, N. Y.  
Aeroli Burner Co., West New York, N. J.  
Beach Mfg. Co., Charlotte, Mich.  
Charleroi Iron Wks., Charleroi, Pa.  
Chase & Lyman, Boston, Mass.  
Hauck Mfg. Co., Brooklyn, N. Y.  
Kinney Mfg. Co., Boston, Mass.  
Lancaster Iron Works, Inc., Lancaster, Pa.  
Littleford Bros., Cincinnati, Ohio  
Macleod Co., Cincinnati, Ohio  
Spears-Wellis Mch. Co., Oakland, Cal.  
G. L. Stuebner Jr. Wks., Inc., Long Island City, N. Y.  
Tarrant Mfg. Co., Saratoga Springs, N. Y.  
Universal Rd. Mach. Co., Kingston, N. Y.

## LANTHERNS, CONTRACTORS'

\*R. B. Dietz Co., New York  
\*Alex. Milburn Co., Baltimore, Md.

\*National Carbide Sales Corp., New York  
Defiance Lantern & Stamping Co., Rochester, N. Y.  
Economy Electric Lantern Co., Chicago  
Handlan, Buck Mfg. Co., St. Louis  
National Carbon Co., Inc., New York City  
Star Headlight & Lantern Co., Rochester, N. Y.

## LATH, METAL

\*Truscen Steel Co., Youngstown, Ohio  
Berger Mfg. Co., Canton, Ohio  
Bostwick Steel Lath Co., Miles, Ohio  
Consolidated Exp. Metals Co., Wheeling, W. Va.  
Decatur Cornice & Roofing Co., Albany, Ala.  
Edwards Mfg. Co., Cincinnati  
Gensire Steel Co., Youngstown, Ohio  
Milwaukee Corr. Co., Milwaukee, Wis.  
Northwestern Exp. Metal Co., Chicago  
Penn. Metal Co., Boston, Mass.  
St. Paul Corr. Co., St. Paul, Minn.  
Sykes Metal Lath & Roofing Co., Niles, O.  
Wheeling Corr. Co., Wheeling, W. Va.  
Youngstown Pressed Steel Co., Warren, O.

## LAWN MOWERS

Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.  
Coldwell Lawn Mower Co., Newburgh, N. Y.  
Gibson Mfg. Co., Port Washington, Wis.  
Ideal Power Lawn Mower Co., Lansing, Mich.  
Jacobson Mfg. Co., Racine, Wis.  
Modern Mach. Works, Milwaukee  
Penna. Lawn Mower Works, Philadelphia, Pa.  
Phila. Lawn Mower Co., Philadelphia, Pa.  
S. P. Townsend Co., Bloomfield, N. J.  
Werthington Mower Co., Stroudsburg, Pa.

## LAWN MOWER SHARPENERS

Fate-Root-Heath Co., Plymouth, Ohio

## LEAD-MELTING FURNACES

Aeroli Burner Co., West New York, N. J.  
Chicago Flexible Shaft Co., Chicago  
Hauck Mfg. Co., Brooklyn, N. Y.  
Littleford Bros., Cincinnati, Ohio  
A. P. Smith Mfg. Co., East Orange, N. J.

## LETTERING GUIDES

Wood-Regan Inst. Co., So. Orange, N. J.

## LIGHTS, ACETYLENE

\*Nat. Carbide Sales Corp., New York  
\*Oxweld Acetylene Co., New York  
General Electric Co., Schenectady, N. Y.  
Kohler Co., Kohler, Wis.  
Alex. Milburn Co., Baltimore, Md.  
Westinghouse El. & Mfg. Co., E. Pittsburgh, Pa.

LIGHTING STANDARDS (See Street Lamp Posts)

## LIGHTS, WARNING

\*Toledo Pressed Steel Co., Toledo, Ohio  
McCluskey Torch Co., Toledo, Ohio  
National Carbon Co., New York

## LIQUID CHLORINE

Arnold, Hoffman & Co., Inc., New York  
Electro Bleaching Gas Co., New York  
Hooker Electrochemical Co., New York  
Mathieson Alkali Works, Inc., New York  
Penna. Salt Mfg. Co., Philadelphia, Pa.

## LOADERS, GRAVEL, WAGON, CAR, ETC.

\*Atlas Engineering Co., Clintonville, Wis.  
\*Barber-Greene Co., Aurora, Ill.  
\*Bay City Shovel, Inc., Bay City, Mich.  
\*Bucyrus-Erie Co., Erie, Pa.  
\*Burch Corp., Crestline, Ohio  
\*Chicago Automatic Conv. Co., Chicago  
\*Fairfield Engineering Co., Marion, Ohio  
\*Geo. Haisa Mfg. Co., N. Y.  
\*Heitzel St. Form & Ir. Co., Warren, Ohio  
\*Industrial Brownhoist Corp., Cleveland  
\*Nelson Iron Works, Passaic, N. J.  
\*Sanerman Bros., Chicago  
\*Trackson Co., Milwaukee, Wis.  
Bonney Supply Co., Inc., Rochester, N. Y.  
Conant Mach. Co., Concord Junction, Mass.  
F-S Mfg. Co., New Holstein, Wis.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Gifford-Wood Co., Hudson, N. Y.  
Hughes-Keenan Co., Mansfield, Ohio  
Jeffrey Mfg. Co., Columbus, Ohio  
Kent Machine Co., Kent, Ohio  
Lee Trailer & Body Co., Plymouth, Ind.  
Link-Belt Co., Chicago  
Logan Co., Louisville, Ky.  
New Holland Mch. Co., N. Holland, Pa.  
Northern Conveyor Co., Janesville, Wis.  
Portable Machinery Co., Clifton, N. J.  
H. B. Sackett Screen & Chute Co., Chicago  
Spears-Wellis Mch. Co., Oakland, Cal.  
Specialty Engineering Co., Philadelphia, Pa.  
Star Drilling Mach. Co., Akron, Ohio  
Universal Rd. Mach. Co., Kingston, N. Y.  
Weller Mfg. Co., Chicago

## LOCKERS, STEEL

All-Steel Equip. Co., Aurora, Ill.  
Berger Mfg. Co., Canton, Ohio  
Durabilt Steel Locker Co., Aurora, Ill.  
Durand Steel Locker Co., Chicago  
Hart & Hutchinson Co., N. Britain, Conn.  
Lyon Metallic Mfg. Co., Aurora, Ill.  
Fred. Medart Mfg. Co., St. Louis, Mo.  
Narragansett Mach. Co., Providence, R. I.

## LOCOMOTIVES, FOR CONTRACTORS, ETC.

Baldwin Loe. Works, Philadelphia, Pa.  
Brookville Locomotive Co., Brookville, Pa.  
Fate-Root-Heath Co., Plymouth, Ohio  
Davenport Loe. Works, Davenport, Iowa  
Holzer Locomotive Works, Erie, Pa.  
Lima Loe. Works, Lima, Ohio  
Mid-West Locomotive Works, Cincinnati  
Milwaukee Loe. Mfg. Co., Milwaukee  
H. K. Porter Co., Pittsburgh, Pa.  
Vulcan Iron Works, Wilkes-Barre, Pa.  
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.  
Geo. D. Whitcomb Co., Rochelle, Ill.

## LUBRICANTS

\*D-A Lubricant Co., Indianapolis, Ind.  
\*Joseph Dixon Crucible Co., Jersey City, N. J.  
Texas Co., New York

## LUBRICATORS

The Bassick Mfg. Co., Chicago  
Carr Fastener Co., Cambridge, Mass.

## MANGANESE STEEL PRODUCTS

American Manganese St. Co., Chicago H'ts., Ill.  
Taylor-Wharton Jr. & St. Co., High Bridge, N. J.

## MANHOLE COVERS (See Castings)

## METAL LATH (See Lath)

## METAL ROOFING (See Roofing)

## METER BOXES

Builders Iron Foundry, Providence, R. I.  
H. W. Clark Co., Mattoon, Ill.  
Clarkville Fdry. & Mach. Co., Clarksville, Tenn.  
J. B. Clow & Sons, Chicago  
Columbian Iron Works, Chattanooga, Tenn.  
Ford Meter Box Co., Wabash, Ind.  
Mueller Co., Decatur, Ill.  
J. S. Schofield's Sons Co., Macon, Ga.

## METER COUPLINGS

\*Neptune Meter Co., New York  
H. W. Clark Co., Mattoon, Ill.  
Ford Meter Box Co., Wabash, Ind.  
Hersey Mfg. Co., So. Boston, Mass.  
Mueller Co., Decatur, Ill.  
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.  
Union Water Meter Co., Worcester, Mass.

## METER TESTERS

\*Neptune Meter Co., New York  
H. W. Clark Co., Mattoon, Ill.  
Ford Meter Box Co., Wabash, Ind.  
Mueller Co., Decatur, Ill.  
National Meter Co., New York  
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

## METERS, ELECTRIC (WATTHOUR)

Duncan Elec. Mfg. Co., LaFayette, Ind.  
General Electric Co., Schenectady, N. Y.  
Sangamo Electric Co., Springfield, Ill.  
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

## METERS, WATER, OIL & GASOLINE

\*Neptune Meter Co., New York  
Badger Meter Mfg. Co., Milwaukee  
Buffalo Meter Co., Buffalo, N. Y.  
Federal Meter Corp., E. Orange, N. J.  
Gamon Meter Co., Newark, N. J.  
Hersey Mfg. Co., Boston, Mass.  
National Meter Co., New York  
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.  
Phoenix Meter Co., Prince Bay, St. Isl., N. Y.  
Thomson Meter Corp., New York  
Union Water Meter Co., Worcester, Mass.  
Werthington Pump & Mch. Corp., New York

## METERS, WATER (VENTURI TYPE)

Builders Iron Fdry., Providence, R. I.  
Simplex Valve & Meter Co., Philadelphia, Pa.

## MIXERS, CONCRETE (See Concrete Mixers)

## MIXERS, GROUT

\*Lakewood Eng. Co., Cleveland, Ohio  
\*Union Iron Works, Inc., Hoboken, N. J.  
Kent Mach. Co., Cayahoga Falls, Ohio  
T. L. Smith Co., Milwaukee, Wis.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

**For FULL  
RAPID and  
RELIABLE**

# LOADING



*Subgrade Cutting—Where Yardage Counts*

## The NEW NELSON Q-7 LOADER

**FULL:**

Big trucks heaped up front and rear by the long swivel spout with  $9\frac{1}{2}$  feet discharge height. No trucks going out half-loaded,—a full cargo every time.

**RAPID:**

Two good yards a minute in stone,  $2\frac{1}{2}$  to 3 yards in sand and earth. Cuts loading time and keeps trucks moving right along and earning money.

**RELIABLE:**

Powered by the McCormick-Deering 10-20 Tractor with smooth-running spiral feeders and steady ground-gripping crawlers. Heavy chains, repairs few and easy.

## BUILT FOR HARD WORK

with

**BRUTAL STRENGTH  
EASE OF OPERATION  
MECHANICAL SIMPLICITY  
FREEDOM FROM BREAKDOWN**

**The N. P. NELSON IRON WORKS, Inc.**

**822 Bloomfield Avenue**

**::**

**Passaic, N. J.**



# Where to Purchase

## MIXERS, MORTAR

\*Atlas Engineering Co., Clintonville, Wis.  
 \*C. H. & E. Mfg. Co., Milwaukee, Wis.  
 \*Heltzel St. Form & Ir. Co., Warren, Ohio  
 \*Jaeger Machine Co., Columbus, Ohio  
 \*Lakewood Eng. Co., Cleveland, Ohio  
 \*John Lanson Mfg. Co., New Holstein, Wis.  
 \*Ransome Conc. Mch. Co., Danellen, N. J.  
 Anchor Mfg. Co., Chicago  
 Archer Iron Works, Chicago  
 Blystone Mfg. Co., Cambridge Spgs., Pa.  
 Construction Machy. Co., Waterloo, Iowa  
 Morris K. Davis, San Francisco, Calif.  
 Kent Machine Co., Kent, Ohio  
 Kiel Machine Co., Kiel, Wis.  
 Knickerbocker Co., Jackson, Mich.  
 Lansing Co., Lansing, Mich.  
 Melly-Blumberg Co., New Holstein, Wis.  
 T. L. Smith Co., Milwaukee, Wis.  
 Standard Scale & Sup. Corp., Pittsburgh  
 Talbot-Flood Mfg. Co., Kansas City, Mo.

## MIXERS, PLASTER

\*Atlas Engineering Co., Clintonville, Wis.  
 \*Conveying Weigher Co., N. Y.  
 \*Jaeger Machine Co., Columbus, Ohio  
 \*John Lanson Mfg. Co., New Holstein, Wis.  
 Anchor Mfg. Co., Chicago  
 Blystone Mfg. Co., Cambridge Spgs., Pa.  
 Construction Machy. Co., Waterloo, Iowa  
 Morris K. Davis, San Francisco, Calif.  
 Eslick & Co., Los Angeles, Cal.  
 Knickerbocker Co., Jackson, Mich.  
 Melly-Blumberg Co., New Holstein, Wis.  
 Standard Scale & Sup. Corp., Pittsburgh  
 Talbot-Flood Mfg. Co., Kansas City, Mo.

## MORTAR BOXES

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*General Wheelbarrow Co., Cleveland, Ohio  
 \*Heltzel St. Form & Ir. Co., Warren, Ohio  
 \*Jos. Honherst Co., Cincinnati, Ohio  
 Anchor Mfg. Co., Chicago, Ill.  
 Beatrice Steel Tank Mfg. Co., Beatrice, Neb.  
 Canton Art Metal Co., Canton, Ohio  
 Donley Bros. Co., Cleveland, O.  
 Empire Metal Tank Wks., E. Rochester, N. Y.  
 Morris K. Davis, San Francisco, Calif.  
 Littleford Bros., Cincinnati

## MOTORCYCLES

Cleveland Motorcycles Co., Cleveland, Ohio  
 Excelsior Motor Mfg. & Supply Co., Chicago  
 Harley-Davidson Motor Co., Milwaukee  
 Indian Motorcycle Co., Springfield, Mass.

## MOTORS, GASOLINE (See Engines, Gas and Gasoline)

## MOTOR TRUCKS

\*Dodge Bros., Detroit  
 \*International Harvester Co., Chicago  
 Aime Motor Truck Co., Cadillac, Mich.  
 Amer.-La France & Foamite Corp., New York  
 Atterbury Motor Car Co., Buffalo, N. Y.  
 Autocar Co., Ardmore, Pa.  
 Beasmer Motor Truck Co., Grove City, Pa.  
 Brockway Motor Truck Co., Cortland, N. Y.  
 Clydesdale Motor Truck Co., Clyde, Ohio  
 Commerce Motor Trk. Co., Ypsilanti, Mich.  
 Denby Motor Truck Co., Detroit, Mich.  
 Diamond T. Motor Car Co., Chicago  
 Duplex Truck Co., Lansing, Mich.  
 Federal Motor Truck Co., Detroit  
 Ford Motor Co., Detroit  
 Four Wheel Drive Auto Co., Clintonville, Wis.  
 General Motors Truck Co., Chicago  
 Gramm Motors, Inc., Lima, Ohio  
 The Hug Co., Highland, Ill.  
 Indiana Truck Corp., Marion, Ind.  
 Kelly Springfield Truck & Bus Corp., Springfield, Ohio  
 Larabee-Deyo Motor Tr. Co., Binghamton, N.Y.  
 Leedinghaus-Espenschied Wagon Co., St. Louis  
 Mack Trucks, Inc., New York  
 Pierce-Arrow Motor Car Co., Buffalo  
 Roe Motor Car Co., Lansing, Mich.  
 Republic Truck Sales Corp., Alma, Mich.  
 Relay Motors Corp., Wabash, Ind.  
 Standard Motor Truck Co., Detroit  
 Sterling Motor Truck Co., Milwaukee  
 Stewart Motor Corp., Buffalo, N. Y.  
 Toppins Trac. Truck Co., Appleton, Wis.  
 Traffic Motor Tr. Co., St. Louis, Mo.  
 United Motor Products Co., Grand Rapids, Mich.  
 U. S. Motor Truck Co., Cincinnati, Ohio  
 Leedinghaus-Espenschied Wagon Co., St. Louis  
 Walter Motor Truck Co., L. I. City, N. Y.  
 White Co., Cleveland, Ohio  
 Yellow Truck & Coach Mfg. Co., Chicago

## MOULDS, CONCRETE

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Heltzel St. Form & Ir. Co., Warren, Ohio

## MUCKING, MACHINES

Hear Shovel Co., Duluth, Minn.

## NUMBERS, HOUSE (See House Numbers)

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

## OILS, ROAD

\*Barber Asphalt Co., Philadelphia, Pa.  
 \*Barrett Co., N. Y.  
 \*Standard Oil Co. (Indiana), Chicago  
 \*Standard Oil Co. (N. Y.), N. Y.  
 Atl. Ref. & Asph. Corp., Philadelphia, Pa.  
 Headley Good Roads Co., Philadelphia, Pa.  
 Pioneer Asph. Co., Lawrenceville, Ill.  
 Standard Oil Co. (La.), N. Orleans, La.  
 Standard Oil Co. (N. J.), Newark, N. J.  
 Texas Company, N. Y.

## OXY-ACETYLENE APPARATUS

\*Oxweld Acetylene Co., Long Island City, N. Y.  
 Alex. Milburn Co., Baltimore, Md.

## PACKING, WATER PIPE

The Leadite Co., Philadelphia, Pa.  
 United Lead Company, N. Y.

## PAINTING MACHINERY

Binks Spray Equipment Co., Chicago  
 Chicago Pneumatic Tool Co., New York  
 De Vilbiss Mfg. Co., Toledo, Ohio  
 Eclipse Air Brush Co., Newark, N. J.  
 W. N. Matthews Corp., St. Louis  
 Alex. Milburn Co., Baltimore, Md.  
 Pasache Air Brush Co., Chicago  
 Simons Paint Spray Brush Co., Dayton, Ohio  
 Spruce Painting Equip. Co., Boston

## PAINTS, METAL PROTECTION

\*Barber Asphalt Co., Philadelphia  
 \*Barrett Co., New York  
 \*Carey Co., Philad., Cincinnati  
 \*Jos. Dixon Crucible Co., Jersey City, N. J.  
 \*McEverlast, Inc., Los Angeles, Calif.  
 \*Solway Sales Corp., New York  
 Acme White Lead & Color Works, Detroit  
 Berry Bros., Detroit  
 Cook Paint & Varnish Co., Kansas City, Mo.  
 Detroit Graphite Co., Detroit  
 Detroit White Lead Works, Detroit  
 E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.  
 Euclid Chemical Co., Cleveland, Ohio  
 Hoosier Paint Works, Ft. Wayne, Ind.  
 Minwax Co., N. Y.  
 Protexol Corp., Kenilworth, N. J.  
 Ruberoid Co., N. Y.  
 Serviced Products Corp., Chicago  
 Sherwin-Williams Co., Cleveland, Ohio  
 L. Sonneborn Sons, N. Y.  
 Toch Brothers, N. Y.  
 Tropical Paint & Oil Co., Cleveland, Ohio  
 Truseon Laboratories, Detroit

## PARK BENCHES

Logan Co., Louisville, Ky.  
 Fred J. Meyers Mfg. Co., Hamilton, Ohio  
 Milleraville Supply Co., Milleraville, Pa.  
 Stewart Iron Works Co., Cincinnati, Ohio  
 Van Dorn Iron Works Co., Cleveland

## PAVEMENT BREAKERS (See Breakers)

## PAVERS, CONCRETE

\*Jaeger Mach. Co., Columbus, Ohio  
 \*Kochring Co., Milwaukee  
 \*Lakewood Eng. Co., Cleveland, Ohio  
 \*Ransome Conc. Mch. Co., Danellen, N. J.  
 Chain Belt Co., Milwaukee  
 Foote Co., Nunda, N. Y.  
 T. L. Smith Co., Milwaukee

## PAVING AND ROAD ROLLERS (See Road and Paving Rollers)

## PAVING BLOCKS, CREOSOTED WOOD (See Creosoted Blocks)

## PAVING BRICK

Alton Brick Co., Alton, Ill.  
 Buckeye Shale Brick Co., Cleveland, Ohio  
 Buffalo Brick Co., Buffalo, Kan.  
 Cleveland Brick & Clay Co., Cleveland, Ohio  
 Collinwood Shale Brick Co., Cleveland, Ohio  
 Corry Brick & Tile Corp., Corry, Pa.  
 Crescent Brick Co., Pittsburgh, Pa.  
 Euclid Shale Brick Co., Cleveland, Ohio  
 Georgia Vit. Brick Co., Augusta, Ga.  
 Globe Brick Co., E. Liverpool, Ohio  
 Hammond Fire Brick Co., Fairmount, W. Va.  
 Hixsylvania Coal Co., Columbus, Ohio  
 Hocking Valley Brick Co., Columbus, Ohio  
 McAvoy Brick Co., Bridgeville, Pa.  
 Mayer Brick Co., Bridgeville, Pa.  
 Metropolis Paving Brick Co., Pittsburgh, Kan.  
 Metropolitan Paving Brick Co., Canton, Ohio  
 Mineral Wells Brick Co., Mineral Wells, Tex.  
 Moberly Paving Brick Co., Moberly, Mo.  
 Murphysboro Paving Brick Co., Murphysboro, Ill.  
 Nelson Brick Co., Nelsonville, Ohio  
 Nelsonville Brick Co., Columbus, Ohio  
 Patton Clay Mfg. Co., Patton, Pa.

Paxton Brick Co., Watsonburg, Pa.  
 Peebles Paving Brick Co., Portsmouth, Ohio  
 Peoria Brick & Tile Co., Peoria, Ill.  
 Purington Paving Brick Co., Galesburg, Ill.  
 Ross Shale Brick Co., Veedersburg, Ill.  
 Russell Clay Mfg. Co., Alton, Ala.  
 So. Clay Mfg., Chattanooga, Tenn.  
 Springfield Paving Brick, Springfield, Ill.  
 Sterling Brick Co., Olean, N. Y.  
 Streator Clay Mfg. Co., Streator, Ill.  
 Terra Haute Vit. Brick Co., Terra Haute, Ind.  
 Thornton Fire Brick Co., Clarksburg, W. Va.  
 Thurber Brick Co., Thurber, Tex.  
 Toronto Fire Clay Co., Toronto, Ohio  
 Trinidad Brick & Tile Co., Trinidad, Ohio  
 United Clay Products Corp., Kansas City  
 Western Shale Products Co., Ft. Scott, Kan.  
 Westport Paving Brick Co., Westport, Md.

## PAVING MACHINERY (See Road and Paving Machinery)

## PAVING GUARDS, STEEL

W. S. Godwin Co., Baltimore, Md.

## PAVING MATERIALS (See "Asphalt," "Paving Brick," "Granite Block," etc.)

## PAVING MIXERS (See Concrete Mixers)

## PAVING TOOLS

\*Barber Asphalt Co., Philadelphia, Pa.  
 \*Chausse Oil Burner Co., Elkhart, Ind.  
 \*Cennery & Co., Philadelphia, Pa.  
 \*Jos. Honherst Co., Cincinnati, Ohio  
 \*Union Iron Works, Inc., Hoboken, N. J.  
 \*Aeroli Burner Co., West New York, N. J.  
 W. H. Anderson Tool & Supply Co., Detroit  
 W. D. Cummer & Sons Co., Cleveland, Ohio  
 Hauck Mfg. Co., Brooklyn, N. Y.  
 Littleford Bros. Co., Cincinnati, Ohio  
 Warren Bros. Co., Boston

## PICKS

Hubbard Co., Pittsburgh, Pa.  
 Iron City Tool Works, Pittsburgh  
 Klein-Logan Co., Pittsburgh  
 Oliver Iron & Steel Corp., Pittsburgh, Pa.  
 Verona Tool Works, Verona, Pa.  
 Warren Tool & Forge Co., Warren, Ohio  
 Warwood Tool Co., Wheeling, W. Va.  
 Wyoming Shovel Works, Wyoming, Pa.

## PILE DRIVERS

\*Brown Clutch Co., Sandusky, Ohio  
 \*Bacrus-Erie Co., Erie, Pa.  
 \*Clyde Iron Works Sales Co., Duluth, Minn.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*McKiernan-Terry Drill Co., N. Y.  
 \*Union Iron Works, Inc., Hoboken, N. J.  
 Lidgetwood Mfg. Co., Elizabeth, N. J.  
 McMyler Interstate Co., Cleveland, Ohio  
 Mead-Morrison Mfg. Co., East Boston

## PILE-HAMMERS, STEAM

\*Clyde Iron Works Sales Co., Duluth, Minn.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*McKiernan-Terry Drill Co., N. Y.  
 \*Union Iron Works, Inc., Hoboken, N. J.  
 \*Wemlinger, Inc., N. Y.  
 National Hoisting Engine Co., Harrison, N. J.  
 Vulcan Iron Works, Chicago

## PILING, CONCRETE

MacArthur Conc. Pile & F'd'n Co., N. Y.  
 Raymond Concrete Pile Co., N. Y.

## PILING, INTERLOCKING STEEL

\*Wemlinger, Inc., New York  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carnegie Steel Co., Pittsburgh

## PILING, STEEL SHEET

\*Wemlinger, Inc., New York  
 Bethlehem Steel Co., Bethlehem, Pa.

## PIPE, CAST IRON

\*Central Foundry Co., N. Y.  
 \*U. S. Pipe & Foundry Co., Burlington, N. J.  
 Am. Cast Iron Pipe Co., Birmingham, Ala.  
 J. B. Olow & Sons, Chicago  
 Donaldson Iron Co., Emsas, Pa.  
 John Fox & Co., N. Y.  
 Glamorgan Pipe & F'dry Co., Lynchburg, Va.  
 Lynchburg F'dry Co., Lynchburg, Va.  
 McWane Cast Iron Pipe Co., Birmingham, Ala.  
 National Cast Iron Pipe Co., Birmingham, Ala.  
 Warren Foundry & Pipe Co., N. Y.  
 R. D. Wood & Co., Philadelphia, Pa.

## PIPE, CULVERT (See Culverts)



## EIGHTY FEET UNDER WATER



Twelve hundred timber piles, driven *eighty feet under water*, with a McKiernan-Terry 9-B-2 Pile Hammer. On the same job, 525 piles driven to exact grade from 34 to 40 feet below the surface—26 piles per 7-hour shift (average) . . . These are typical of the interesting submarine pile driving jobs illustrated in McKiernan-Terry Bulletin 37. This book contains a hundred other job pictures, including all kinds of pile driving and pulling, from the heaviest to the lightest. Yours on request. Please address McKiernan-Terry Drill Company, 19 Park Row, New York.



### McKiernan-Terry Double-Acting Pile Hammers

"DUBL-DUTY" DRIVERS AND PULLERS



## McKiernan-Terry PILE HAMMERS

# Where to Purchase

## PIPE, LEAD

United Lead Company, N. Y.

## PIPE, REINFORCED CONCRETE

\*Newark Concrete Pipe Co., Newark, N. J.  
Concrete Products Co., Pittsburgh, Pa.  
Core Joint Concrete Pipe Co., Baltimore  
Independent Concrete Pipe Co., Indianapolis  
Lock Joint Pipe Co., Ampere, N. J.

## PIPE, RIVETED STEEL OR IRON

\*Connerly & Co., Inc., Philadelphia, Pa.  
\*Jon. Honhorst Co., Cincinnati, O.  
Abendroth & Root Mfg. Co., Newburgh, N. Y.  
American Spiral Pipe Works, Chicago  
Biggs Boiler Works, Akron  
Canton Culvert & Silo Co., Canton, O.  
Chattanooga Boiler & Tank Co., Chattanooga, Tenn.  
Chicago Bridge & Iron Works, Chicago  
East Jersey Pipe Co., N. Y.  
Hammond Iron Works, Warren, Pa.  
R. Hardesty Mfg. Co., Denver  
Lancaster Iron Works, Lancaster, Pa.  
Littleford Bros., Cincinnati, O.  
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
Tippett & Wood, Phillipsburg, N. J.  
Weller Mfg. Co., Chicago

## PIPE, STEEL

Central Tube Co., Pittsburgh, Pa.  
Jones & Laughlin Steel Co., Pittsburgh  
National Tube Co., Pittsburgh  
Republic Iron & Steel Co., Youngstown, O.  
South Chester Tube Co., Chester, Pa.  
Spang-Chalfont & Co., Pittsburgh, Pa.  
Wheeling Steel Corp., Wheeling, W. Va.  
Youngstown Sheet & Tube Co., Youngstown, O.

## PIPE, WOOD

American Wood Pipe Co., Tacoma, Wash.  
Federal Tank & Pipe Co., Seattle, Wash.  
Michigan Pipe Co., Bay City, Mich.  
Pacific Pipe & Tank Co., San Francisco  
Redwood Mfrs. Co., San Francisco  
Standard Wood Pipe Co., Williamsport, Pa.  
A. Wyckoff & Sons Co., Elmira, N. Y.

## PIPE, WROUGHT IRON

A. M. Byers Co., Pittsburgh, Pa.  
Cohoes Rolling Mill Co., Cohoes, N. Y.  
Reading Iron Co., Reading, Pa.

## PIPE BENDING MACHINES

American Pipe Bending Mach. Co., Boston  
Watson-Stillman Co., New York

## PIPE COVERING

### AIRCELL

\*Phillip Carey Co., Cincinnati, Ohio  
Ehret Mag. Mfg. Co., Valley Forge, Pa.  
Johns-Manville, Inc., N. Y.  
Kearney & Mattison Co., Ambler, Pa.  
National Asbestos Co., Jersey City, N. J.  
Norristown Mag. & Ash. Co., Norristown, Pa.  
Sall Mountain Co., Chicago  
H. F. Watson Co., Erie, Pa.

### 85 PER CENT MAGNESIA

\*Phillip Carey Co., Cincinnati, Ohio  
Ehret Mag. Mfg. Co., Valley Forge, Pa.  
Johns-Manville, Inc., N. Y.  
Kearney & Mattison Co., Ambler, Pa.  
Norristown Mag. & Ash. Co., Norristown, Pa.

### WOOD

Redwood Mfrs. Co., San Francisco  
A. Wyckoff & Sons Co., Elmira, N. Y.

## PIPE CUTTERS (See Cutters, Pipe, Head)

## PIPE FITTINGS

\*Central Foundry Co., N. Y.  
\*U. S. Pipe & Foundry Co., Burlington, N. J.  
American Cast Iron Co., Birmingham, Ala.  
Builders Iron Foundry, Providence, R. I.  
J. B. Clow & Sons, Chicago  
Crane Co., Chicago  
Donaldson Iron Co., Emsa, Pa.  
Lankenheimer Co., Cincinnati, O.  
Ntl. C. I. Pipe Co., Birmingham, Ala.  
Reading Steel Casting Co., Inc., Bridgeport, Conn.  
Warren Foundry & Pipe Co., N. Y.  
H. D. Wood & Co., Philadelphia, Pa.

## PIPE HANDLING MACHINERY

Taylor Portable Steel Derrick Co., Chicago

## PIPE TAPPING MACHINERY (See Water Main Tapping)

## PIPE JOINT COMPOUND (Sewer)

\*Phillip Carey Co., Cincinnati, Ohio  
\*Jos. Dixon Crucible Co., Jersey City, N. J.

Atlas Mineral Prod. Co., Meristown, Pa.  
The Leadite Co., Philadelphia, Pa.  
Pacific Flash Tank Co., Chicago and N. Y.  
Hubbard Co., New York  
Texas Co., New York  
Waring-Underwood Co., Philadelphia, Pa.

## PIPE JOINT MATERIAL (Cast Iron)

Hydraulic Development Co., Boston  
The Leadite Co., Philadelphia, Pa.  
United Lead Co., New York

## PIPE PUSHERS

\*Templeton, Kenly & Co., Chicago  
Duff Mfg. Co., Pittsburgh  
Easy Mfg. Co., Lincoln, Neb.  
Giant Mfg. Co., Council Bluffs, Ia.

## PIPE THREADERS

Armstrong Mfg. Co., Bridgeport, Conn.

## PLANERS, PNEUMATIC

Tousley Tool Co., Cleveland, Ohio

## PLAYGROUND APPARATUS

American Playground Device Co., Anderson, Ind.  
Chicago Gymnasium Equipment Co., Chicago  
Everwear Mfg. Co., Springfield, O.  
Giant Mfg. Co., Council Bluffs, Ia.  
Hill-Standard Co., Anderson, Ind.  
R. F. Lamar & Co., Pueblo, Colo.  
Fred. Medart Mfg. Co., St. Louis, Mo.  
Mitchell Mfg. Co., Milwaukee  
Patterson-Williams Co., San Jose, Calif.  
A. G. Spalding & Bros., Chicopee, Mass.

## PLOWS, CONTRACTORS'

\*Austin-Western Road Mach. Co., Chicago  
\*Caterpillar Trac. Co., San Leandro, Cal.  
\*General Wheelbarrow Co., Cleveland  
\*International Harvester Co., Chicago  
\*Roderick Loan Mfg. Co., Mansfield, O.  
J. D. Adams & Co., Indianapolis, Ind.  
American Steel Scraper Co., Sidney, O.  
Deere & Co., Moline, Ill.  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
Moline Implement Co., Moline, Ill.  
Oliver Chilled Plow Works, South Bend, Ind.  
Sidney Steel Scraper Co., Sidney, O.  
Slusser-McLean Scraper Co., Sidney, O.  
Western Wheeled Scraper Co., Aurora, Ill.  
Wiard Plow Co., Batavia, N. Y.

## PLOWS, ROAD AND ROOTER

\*Austin-Western Road Machinery Co., Chicago  
\*Caterpillar Tractor Co., San Leandro, Calif.  
\*General Wheelbarrow Co., Cleveland  
Acme Road Machy. Co., Frankfort, N. Y.  
J. D. Adams & Co., Indianapolis  
American Steel Scraper Co., Sidney, Ohio  
Beach Mfg. Co., Charlotte, Mich.  
Ted Carr & Co., Chicago  
Deere & Co., Moline, Ill.  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
F. B. Hackley Equip. Co., San Francisco  
Sidney Steel Scraper Co., Sidney, Ohio  
Slusser-McLean Scraper Co., Sidney, Ohio  
Western Wheeled Scraper Co., Aurora, Ill.  
Wiard Plow Co., Batavia, N. Y.

## PLUMBING SUPPLIES

J. B. Clow & Sons, Chicago  
Crane Co., Chicago  
Glauber Brass Mfg. Co., Cleveland, O.  
J. L. Mott Iron Works, N. Y.  
Mueller Company, Decatur, Ill.  
Rundle-Spence Mfg. Co., Milwaukee  
Walworth Mfg. Co., Boston

## PNEUMATIC CONCRETE PLACERS

\*Ransome Concrete Machinery Co., Dunellen, N. J.  
Cement-Gun Co., Inc., Allentown, Pa.

## PNEUMATIC GROUT MIXERS & PLACERS

\*Ransome Concrete Machinery Co., Dunellen, N. J.  
Cement-Gun Co., Inc., Allentown, Pa.

## PORTABLE BUILDINGS

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Truscon Steel Co., Youngstown, O.  
Littleford Bros., Cincinnati, O.

## PORTABLE STEEL DERRICKS (See Derricks, Steel Portable)

## PORTABLE WOOD WORKERS

\*American Saw Mill Machinery Co., Hackensack, N. J.  
Jaeger Portable Power Corp., Detroit  
Jones Superior Machine Co., Chicago

## PORTLAND CEMENT (See Cement)

## POTS, ASPHALT AND TAR, POURING

\*Barber Asphalt Co., Philadelphia, Pa.  
Acme Road Machinery Co., Frankfort, N. Y.  
Beach Manufacturing Co., Charlotte, Mich.  
Littleford Bros., Cincinnati, Ohio

## POWDER (See Explosives)

## POWER PLANTS, INDUSTRIAL

\*Continental Motors Corp., Muskegon, Mich.  
\*Hercules Motors Corp., Canton, O.  
\*Sanderson-Cyclone Drill Co., Orrville, O.  
\*Waukesha Motor Co., Waukesha, Wis.  
Buda Co., Harvey, Ill.  
Hilldale, Mich.  
Alamo Engine Co., Hilldale, Mich.  
Climax Engine Co., Clinton, Iowa  
Hinkley Motors, Inc., Detroit  
Serval Mfg. Co., Evansville, Ind.  
Wisconsin Motor Co., Milwaukee, Wis.

## PULLING MACHINES

\*Beebe Bros., Inc., Seattle, Wash.  
\*Clyde Iron Works Sales Co., Duluth, Minn.  
John Waldron Corp., New Brunswick, N. J.

## PUMPS, AIR LIFT

\*Sullivan Machinery Co., Chicago  
American Steam Pump Co., Battle Creek, Mich.  
Chicago Pneumatic Tool Co., New York  
Indiana Air Pump Co., Indianapolis  
Ingersoll-Rand Co., New York

## PUMPS, CENTRIFUGAL

\*Allis-Chalmers Mfg. Co., Milwaukee  
\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
\*Domestic Eng. & Pump Co., Shippensburg, Pa.  
\*Homelite Corp., Port Chester, N. Y.  
\*La Bour Co., Chicago Heights, Ill.  
\*Neve Engine Co., Lansing, Mich.  
\*Trench & Marine Pump Co., New York  
Aldrich Pump Co., Allentown, Pa.  
American Steam Pump Co., Battle Creek, Mich.  
American Well Works, Aurora, Ill.  
Aurora Pump & Mfg. Co., Aurora, Ill.  
Barnes Mfg. Co., Mansfield, Ohio  
Bethlehem Steel Co., Bethlehem, Pa.  
Buffalo Steam Pump Co., Buffalo, N. Y.  
A. S. Cameron Steam Pump Works, New York  
Chain Belt Co., Milwaukee  
Chicago Pump Co., Chicago  
Cook Motor Co., Delaware, O.  
Dayton-Dowd Co., Quincy, Ill.  
Dean Bros. Co., Indianapolis  
De Laval Steam Turbine Co., Trenton, N. J.  
Erie Pump & Engine Works, Medina, N. Y.  
Evinrude Motor Co., Milwaukee  
Fairbanks, Morse & Co., Chicago  
General Electric Co., Schenectady  
Goulds Pumps, Inc., Seneca Falls, N. Y.  
Humphries Mfg. Co., Mansfield, Ohio  
Indiana Air Pump Co., Indianapolis  
Ingersoll-Rand Co., New York  
Keystone Driller Co., Beaver Falls, Pa.  
LeCourtenay Co., Newark, N. J.  
Manistee Iron Works, Manistee, Mich.  
Morris Machine Works, Baldwinville, N. Y.  
Rumsey Pump Co., Seneca Falls, N. Y.  
United Iron Works, Inc., Kansas City, Mo.  
Warren Steam Pump Co., Warren, Mass.  
Weinman Pump Mfg. Co., Columbus, O.  
Wheeler Condenser & Eng. Co., Carters, N. J.  
Worthington Pump & Machinery Corp., N. Y.  
Yeomans Bros. Co., Chicago

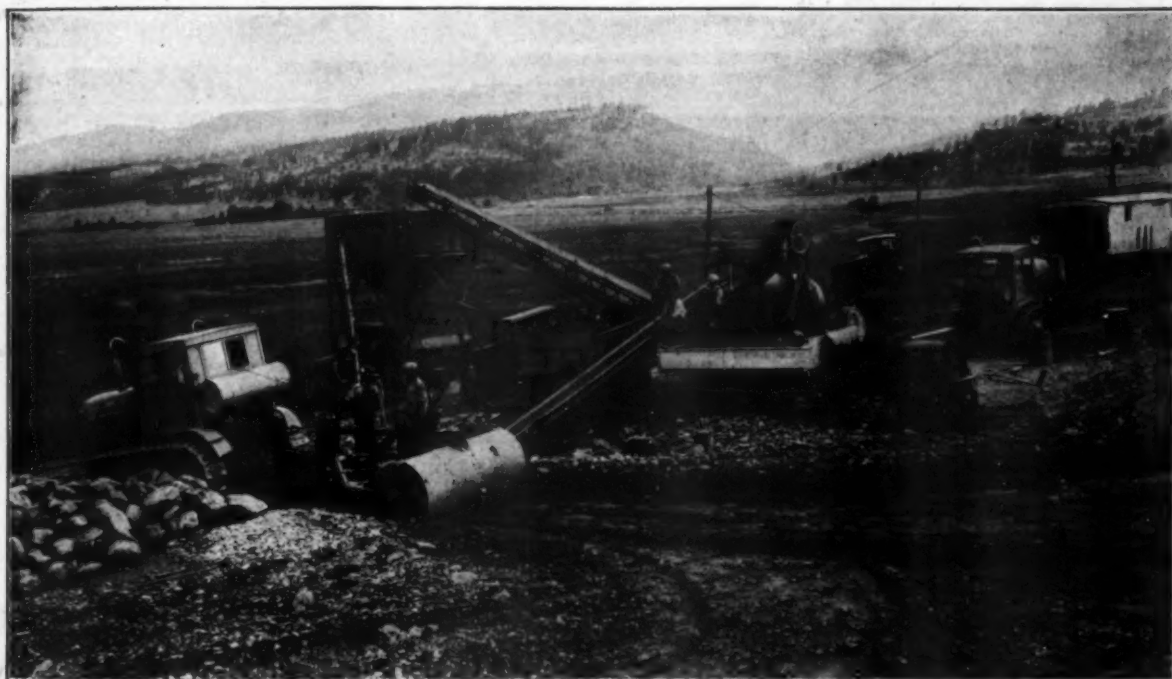
## PUMPS, CONTRACTORS'

\*Allis-Chalmers Mfg. Co., Milwaukee  
\*Ralph B. Carter Co., New York  
\*C. H. & E. Mfg. Co., Milwaukee  
\*Domestic Eng. & Pump Co., Shippensburg, Pa.  
\*Homelite Corp., Port Chester, N. Y.  
\*La Bour Co., Chicago Heights, Ill.  
\*John Lauson Mfg. Co., New Holstein, Wis.  
\*Neve Engine Co., Lansing, Mich.  
\*Trench & Marine Pump Co., New York  
\*Waukesha Motor Co., Waukesha, Wis.  
Aldrich Pump Co., Allentown, Pa.  
American Steam Pump Co., Battle Creek, Mich.  
American Well Works, Aurora, Ill.  
Aurora Pump & Mfg. Co., Aurora, Ill.  
Barnes Mfg. Co., Mansfield, Ohio  
Buda Co., Harvey, Ill.  
A. S. Cameron Steam Pump Works, New York  
Chain Belt Co., Milwaukee  
Construction Machinery Co., Waterloo, Iowa  
Dayton-Dowd Co., Quincy, Ill.  
Deimeg Co., Salem, O.  
Emerson Pump & Valve Co., Alexandria, Va.  
Erie Pump & Engine Works, Medina, N. Y.  
Fairbanks, Morse & Co., Chicago  
Goulds Pumps, Inc., Seneca Falls, New York  
Humphries Mfg. Co., Mansfield, Ohio  
Ingersoll-Rand Co., New York  
Jaeger Portable Power Corp., Detroit

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.\*



# Results , , , with a "Caterpillar"



Is the weather bad... the going soft... the load heavy... and are the slopes steep? Turn out a "Caterpillar"—sure of its power, sure of its traction, confident, dependable. It will lick the job whether it is operating a mobile plant, as one of these "Sixtys" is doing, or feeding the conveyor like its mate. And "Caterpillar" track-type tractors stand up. Track parts of heat-treated and hardened steel, bolts of alloy steel—precision machined. No wonder "Caterpillars" do their work "Better, Quicker, Cheaper."

**Caterpillar Tractor Co.**  
EXECUTIVE OFFICES: SAN LEANDRO, CALIFORNIA  
Sales Offices: Peoria, Illinois • 50 Church St., New York • San Leandro, Calif.  
Holt Combined Harvesters • Russell Road Machinery  
"Caterpillar" Tractors

Prices—f. o. b. Peoria, Illinois			
TEN . . . . .	\$1125	TWENTY . . . . .	\$1975
FIFTEEN . . . . .	\$1500	THIRTY . . . . .	\$2475
SIXTY . . . . .	\$4300		

# CATERPILLAR

REG. U.S. PAT. OFF.

# T R A C T O R

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.

# Where to Purchase

## PUMPS, CONTRACTORS, (Continued)

Kinney Mfg. Co., Boston  
LeCourtenay Co., Newark, N. J.  
Morris Machine Works, Baldwinville, N. Y.  
P. E. Myers & Bro. Co., Ashland, O.  
Pulsometer Steam Pump Co., New York  
Ramsey Pump Co., Seneca Falls, N. Y.  
Standard Seal & Supply Corp., Pittsburgh  
Van Noyhays Machine Works, Albany, N. Y.  
Waldo Bros. & Bond Co., Boston, Mass.

## PUMPS, DEEP WELL

\*Domestic Eng. & Pump Co., Shippensburg, Pa.  
\*Hove Engine Co., Lansing, Mich.  
\*Trench & Marine Pump Co., New York  
Aldrich Pump Co., Allentown, Pa.  
American Steam Pump Co., Battle Creek, Mich.  
American Well Works, Aurora, Ill.  
Barnes Mfg. Co., Mansfield, O.  
A. S. Cameron Steam Pump Works, New York  
A. D. Cook, Inc., Lawrenceburg, Ind.  
Dean Bros. Co., Indianapolis  
Deming Co., Salem, O.  
Goulds Pumps, Inc., Seneca Falls, N. Y.  
Harris Air Pump Co., Indianapolis  
Humphreys Mfg. Co., Mansfield, Ohio  
Indiana Air Pump Co., Indianapolis  
Ingersoll-Rand Co., New York  
Keystone Driller Co., Beaver Falls, Pa.  
Layne & Bowler, Inc., Memphis, Tenn.  
A. Y. McDonald Mfg. Co., Dubuque, Iowa  
Midwest Engineering Co., Indianapolis, Ind.  
P. E. Myers & Bro., Ashland, O.  
Ramsey Pump Co., Seneca Falls, N. Y.  
United Iron Works, Inc., Kansas City, Mo.  
Weinman Pump Mfg. Co., Columbus, O.

## PUMPS, DIAPHRAGM

\*C. H. & E. Mfg. Co., Milwaukee  
\*Ralph H. Carter Co., New York  
\*Construction Machinery Co., Waterloo, Ia.  
\*Domestic Eng. & Pump Co., Shippensburg, Pa.  
\*Hove Engine Co., Lansing, Mich.  
\*Trench & Marine Pump Co., New York  
Aurora Pump & Mfg. Co., Aurora, Ill.  
Barnes Mfg. Co., Mansfield, O.  
Chain Belt Co., Milwaukee, Wis.  
Deming Co., Salem, Ohio  
Dorr Co., New York  
Goulds Pumps, Inc., Seneca Falls, N. Y.  
Humphreys Mfg. Co., Mansfield, Ohio  
Waldo Bros. & Bond Co., Boston, Mass.  
Witte Engine Works, Kansas City, Mo.

## PUMPS, DREDGING

\*Trench & Marine Pump Co., New York  
Ellisott Machinery Corp., Baltimore, Md.  
Erie Pump & Engine Wks., Medina, N. Y.  
Morris Machine Works, Baldwinville, N. Y.

## PUMPS, GASOLINE AND OIL

B. F. Bowser & Co., Inc., Ft. Wayne, Ind.  
Gilbert & Barker Mfg. Co., Springfield, Mass.  
Ingersoll-Rand Co., New York  
Kinney Mfg. Co., Boston  
Tobheim Oil Tank & Pump Co., Ft. Wayne, Ind.  
Wayne Tank & Pump Co., Ft. Wayne, Ind.

## PUMPS, PORTABLE

\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
\*Hemlock Corp., Port Chester, N. Y.  
\*John Lansen Mfg. Co., New Holstein, Wis.  
\*Trench & Marine Pump Co., New York  
American Steam Pump Co., Battle Creek, Mich.  
Evinrude Motor Co., Milwaukee  
Humphreys Mfg. Co., Mansfield, Ohio  
Jaeger Portable Power Corp., Detroit

## PUMPS, POWER

\*Allis-Chalmers Mfg. Co., Milwaukee  
\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
\*Domestic Eng. & Pump Co., Shippensburg, Pa.  
\*Hemlock Corp., Port Chester, N. Y.  
\*Hove Engine Co., Lansing, Mich.  
\*Trench & Marine Pump Co., New York  
Waukesha Motor Co., Waukesha, Wis.  
Alamo Iron Works, San Antonio, Texas  
Aldrich Pump Co., Allentown, Pa.  
American Steam Pump Co., Battle Creek, Mich.  
American Well Works, Aurora, Ill.  
Aurora Pump & Mfg. Co., Aurora, Ill.  
Barnes Mfg. Co., Mansfield, O.  
Chicago Pump Co., Chicago  
Dayton, Dowd Co., Quincy, Ill.  
De Laval Steam Turbine Co., Trenton, N. J.  
Deming Co., Salem, O.  
Evinrude Motor Co., Milwaukee  
Fairbanks, Morse & Co., Chicago  
Gardner-Denver Co., Quincy, Ill.  
Goulds Pumps, Inc., Seneca Falls, N. Y.  
Humphreys Mfg. Co., Mansfield, Ohio  
Indiana Air Pump Co., Indianapolis  
Ingersoll-Rand Co., New York  
Kinney Mfg. Co., Boston  
Lawrence Machinery Co., Lawrence, Mass.  
LeCourtenay Co., Newark, N. J.

P. E. Myers & Bro. Co., Ashland, O.  
Northern Fire Apparatus Co., Minneapolis  
Ramsey Pump Co., Seneca Falls, N. Y.  
Weinman Pump Mfg. Co., Columbus, O.  
Worthington Pump & Machinery Corp., N. Y.  
Yeomans Bros. Co., Chicago

## PUMPS, SEWAGE

\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
\*La Bour Co., Chicago Heights, Ill.  
American Steam Pump Co., Battle Creek, Mich.  
American Well Works, Aurora, Ill.  
Barnes Mfg. Co., Mansfield, O.  
A. S. Cameron Steam Pump Works, New York  
Chicago Pump Co., Chicago  
Fairbanks, Morse & Co., Chicago  
Humphreys Mfg. Co., Mansfield, Ohio  
Ingersoll-Rand Co., New York  
Pacific Flush Tank Co., Chicago and N. Y.  
Warren Steam Pump Co., Warren, Mass.  
Yeomans Bros. Co., Chicago

## PUMPS, TAR AND ASPHALT

\*Barber Asphalt Co., Philadelphia  
Kinney Mfg. Co., Boston

## PUNCHES AND DIES, STEEL

\*Cleveland Steel Tool Co., Cleveland, O.

## RADIATORS FOR GASOLINE ENGINES

McCord Radiator Mfg. Co., Detroit  
Modine Mfg. Co., Racine, Wis.  
Racine Radiator Co., Racine, Wis.  
Young Radiator Co., Racine, Wis.

## RAIL AND RAIL JOINTS

Bethlehem Steel Co., Bethlehem, Pa.  
Carnegie Steel Co., Pittsburgh, Pa.  
Easton Car & Construction Co., Easton, Pa.  
Koppel Ind. Car & Equipment Co., Koppel, Pa.  
Sweet's Steel Co., Williamsport, Pa.  
W. A. Zeinicker Supply Co., St. Louis, Mo.

## RAILROAD DITCHERS (See Excavators, Ditch and Trench)

## REINFORCING CONCRETE (See Concrete Reinforcement)

## RIVETERS, PNEUMATIC

\*The Buhl Company, Chicago  
\*Independent Pne. Tool Co., Chicago  
Alliance Machine Co., Alliance, O.  
Chicago Pneumatic Tool Co., New York  
Cleveland Pneumatic Tool Co., Cleveland, O.  
Hanna Engineering Works, Chicago  
Helwig Mfg. Co., St. Paul, Minn.  
Ingersoll-Rand Co., New York  
Wm. H. Keller, Inc., Grand Haven, Mich.  
Southwark Foundry & Machine Co., Phila.  
Watson-Stillman Co., New York

## RIVET SETS

\*Cleveland Steel Tool Co., Cleveland, O.  
\*Independent Pne. Tool Co., Chicago  
Chicago Pneumatic Tool Co., New York  
Cleveland Pneumatic Tool Co., Cleveland, O.  
Dunbar Drop Forge Co., Chicago  
Ingersoll-Rand Co., New York

## ROAD GRADERS, HORSE OR TRACTOR DRAWN

\*Austin-Western Road Mch. Co., Chicago  
\*Baker Mfg. Co., Springfield, Ill.  
\*Caterpillar Tractor Co., San Leandro, Cal.  
\*Good Roads Machinery Co., Kennett Sq., Pa.  
\*Killefer Mfg. Co., Los Angeles  
\*W. A. Riddell Co., Bucyrus, O.  
\*Gustav Schaefer Co., Cleveland  
Acme Road Machy. Co., Frankfort, N. Y.  
J. D. Adams & Co., Indianapolis, Ind.  
Austin Mfg. Co., Chicago  
Banting Mfg. Co., Toledo, O.  
Beach Mfg. Co., Charlotte, Mich.  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
Gilbert Mfg. Co., Aberdeen, S. D.  
Klaner Mfg. Co., Dubuque, Iowa  
Little Red Wagon Mfg. Co., Omaha  
Lytle Culvert & Road Equipment Co., Minneapolis  
N. B. Monroe & Sons, Arthur, Ill.  
New England Road Machy. Co., So. Boston, Mass.  
Owensboro Ditcher & Grader Co., Owensboro, Ky.  
Rome Mfg. Co., Rome, N. Y.  
Ryan Mfg. Co., Chicago  
Spears-Wells Machinery Co., Oakland, Cal.  
Stockland Road Machinery Co., Minneapolis  
Western Wheeled Scraper Co., Aurora, Ill.

## ROAD GRADERS, POWER

\*Austin-Western Road Machy. Co., Chicago  
\*Caterpillar Tractor Co., San Leandro, Cal.  
\*Good Roads Machinery Co., Kennett Sq., Pa.  
\*W. A. Riddell Co., Bucyrus, O.  
Acme Road Machinery Co., Frankfort, N. Y.  
J. D. Adams & Co., Indianapolis  
Beach Mfg. Co., Charlotte, Mich.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
Gilbert Mfg. Co., Aberdeen, S. D.  
Landroth Machinery Co., Jeppla, Mo.  
Little Red Wagon Mfg. Co., Omaha  
Rome Mfg. Co., Rome, N. Y.  
Spears-Wells Machinery Co., Oakland, Cal.  
Wehr Co., Milwaukee

## ROAD MAINTAINERS, POWER

\*Caterpillar Tractor Co., San Leandro, Cal.  
\*Good Roads Machinery Co., Kennett Sq., Pa.  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Landroth Machinery Co., Jeppla, Mo.  
Rome Mfg. Co., Rome, N. Y.  
Spears-Wells Machinery Co., Oakland, Cal.  
Stockland Road Machinery Co., Minneapolis

## ROAD OILS (See Oils, Road)

## ROAD OILERS

\*Austin-Western Road Machy. Co., Chicago  
\*Good Roads Mch. Co., Kennett Sq., Pa.  
E. D. Etnyre & Co., Oregon, Ill.  
Kinney Mfg. Co., Boston  
Mack Trucks, Inc., New York  
Municipal Supply Co., South Bend, Ind.  
Spears-Wells Machinery Co., Oakland, Cal.  
White Co., Cleveland

## ROCK CRUSHERS AND PULVERIZERS (See Crushers)

## ROCK DRILLS (See Drills, Rock)

## ROLLERS, EMBANKMENT

Acme Road Machy. Co., Frankfort, N. Y.  
Beach Mfg. Co., Charlotte, Mich.  
H. W. Rohl & Co., Los Angeles, Calif.

## ROLLERS, ROAD AND PAVING

\*Austin-Western Road Mch. Co., Chicago  
\*Barber Asphalt Co., Philadelphia  
\*Buffalo-Springfield Roller Co., Springfield, O.  
\*Good Roads Machinery Co., Kennett Sq., Pa.  
\*Huber Mfg. Co., Marion, Ohio  
\*W. A. Riddell Co., Bucyrus, Ohio  
Acme Road Machinery Co., Frankfort, N. Y.  
Acme Iron Works, Oswego, N. Y.  
Austin Mfg. Co., Chicago  
Banting Mfg. Co., Toledo, O.  
Beach Mfg. Co., Charlotte, Mich.  
J. I. Case Threshing Mach. Co., Racine, Wis.  
Erie Machine Shops, Erie, Pa.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
Horst & Strietor Co., Davenport, Iowa  
Kinney Standards, Inc., Brooklyn, N. Y.  
Wehr Co., Milwaukee

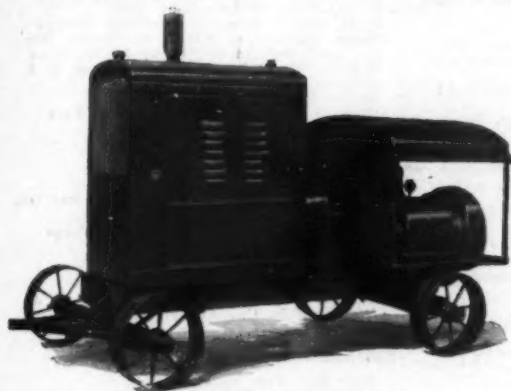
## ROOFING, ASBESTOS, ASPHALT, COMPOSITION, TILE, ETC.

\*Barber Asphalt Co., Philadelphia  
\*Barrett Co., New York  
\*Phillip Carey Co., Cincinnati, O.  
\*Standard Oil Co. (Indiana), Chicago  
American Cement Tile Mfg. Co., Pittsburgh  
Atlantic Refining & Asphalt Corp., Phila., Pa.  
Beaver Products Co., Inc., Buffalo, N. Y.  
Bird & Son, Inc., East Walpole, Mass.  
Certain-teed Products Corp., New York  
Chalfield Mfg. Co., Cincinnati, O.  
Decatur Roofing & Corncore Co., Albany, Ala.  
Edwards Mfg. Co., Cincinnati, O.  
Euclid Chemical Co., Cleveland  
Flintkote Co., Boston  
Johns-Manville, Inc., New York  
Keystone Roofing Mfg. Co., York, Pa.  
The Lehon Co., Chicago  
F. J. Lewis Mfg. Co., Chicago  
National Roofing Co., Tonawanda, N. Y.  
National Sheet Metal Roofing Co., Jersey City, N. J.  
W. F. Norman Sheet Metal Mfg. Co., Nevada, Mo.  
Ruberoid Co., New York  
Sall Mountain Co., Chicago  
Sifo Products Co., St. Paul, Minn.  
L. Sonneborn & Sons, Inc., New York  
Texas Co., New York  
Western Elastolite Roofing Co., Denver

## ROOFING KETTLES (See Kettles)

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.\*

# "FIRST Time in Our History"



NOVO TRIPLEX—One of the three types of Novo Road Pumps

## *no charge against pumping delay*

"Used Novo Triplex Road Pump on five miles of road pumping—four miles through two inch pipe line—ran pump at 200 r.p.m.—had no trouble supplying 27-E paver, one small mixer and two sprinklers—averaged about 250 cubic yards concrete per day—worked against 75 foot head—did not cause one minute delay—FIRST TIME IN HISTORY DID NOT HAVE TO CHARGE A LOSS AGAINST PUMPING DELAY."

COLLINS BROTHERS

## Flud Oil

Novo Flud Oil lubrication positively floods every moving pump part with oil. Yet there is no complicated oil pump—nothing to get out of order—no pipes to clog.

## Constant Pressure

The new Novo Water Governor does what other relief valves cannot. It holds line pressure steady—keeps back pressure from the pump—and permits the engine to idle when no water is being used. There's a 15 to 25% saving in gasoline and wear and tear.

## Good-bye Water Hammer

Novo Road Pumps run at 200 r. p. m. instead of the customary 65. Such high speed operation provides steadier flow without the usual piston pulsations—water hammer is ended—and line pressure is held steadier.

**R**ECORDS like this are not a matter of luck. They are due to the outstanding lead Novo has over the field in design and construction.

The high speed operation—the "Flud Oil" lubrication—the Novo Water Governor are three of these advantages. The Novo Pumping Handbook gives many more.

If you've got a water handling problem that calls for a better-than-ordinary pump—if you are interested in cutting your water pumping costs on all jobs—send for your copy of the Handbook today.

NOVO ENGINE COMPANY, 216 Porter Street, Lansing, Michigan  
Clarence E. Bement, Vice-Pres. & Gen. Mgr.

# NOVO

## PUMPS—ENGINES—HOISTS

Service, parts and sales in over 70 cities

When writing to advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.



# Where to Purchase

## ROPE, MARINE

American Mfg. Co., Brooklyn, N. Y.  
Columbian Rope Co., Auburn, N. Y.  
Cupples Cordage Co., Brooklyn, N. Y.  
Heoven & Allison Co., Xenia, O.  
R. A. Kelly Co., Xenia, O.  
N. Bedford Cordage Co., N. Bedford, Mass.  
Peoria Cordage Co., Peoria, Ill.  
Plymouth Cordage Co., N. Plymouth, Mass.  
St. Louis Cordage Mills, St. Louis, Mo.  
Tabbs Cordage Co., San Francisco  
Wall Rope Works, New York  
Waterbury Co., New York  
Whitlock Cordage Co., New York

## ROPE, WIRE, HOISTING, HAULAGE

\*American Steel & Wire Co., Chicago  
\*L. F. Green, Chicago  
\*Williamsport Wire Rope Co., Williamsport, Pa.  
American Cable Co., Inc., New York  
Broderick & Bascom Rope Co., St. Louis, Mo.  
Fischer & Hayes Rope & Steel Co., Chicago  
Hazard Wire Rope Co., Wilkesbarre, Pa.  
A. Leschen & Sons Rope Co., St. Louis  
Macwhys Co., Kenosha, Wis.  
J. A. Roebbing's Sons Co., Trenton, N. J.  
Upson-Walton Co., Cleveland, Ohio  
Wickwire Spencer Steel Co., New York

## RUBBER TIRES (See Tires)

## SALAMANDERS, OIL BURNING

\*Acroll Burner Co., West New York, N. J.  
Hauke Mfg. Co., Brooklyn, N. Y.  
Littleford Brothers, Cincinnati, Ohio

## SALAMANDERS, COKE OR WOOD BURNING

\*General Wheelbarrow Co., Cleveland, Ohio  
\*Joseph Hornbostel Co., Cincinnati, Ohio  
Jackson Mfg. Co., Harrisburg  
Littleford Brothers, Cincinnati, Ohio

## SAFETY TREADS (See Treads, Safety)

## RASH ROLLER STEEL (See Window Frames and Sash)

## SAW HORSES

Everhot Mfg. Co., Maywood, Ill.

## SAW MILLS & ACCESSORIES

\*American Saw Mill Machy. Co., Hackettstown, N. J.

## SAW RIGS, PORTABLE

\*American Saw Mill Machy. Co., Hackettstown, N. J.  
\*C. H. & E. Mfg. Co., Milwaukee  
\*John Lauson Mfg. Co., New Helstein, Wis.  
Beach Mfg. Co., Montrose, Pa.  
De Walt Products Co., Leola, Pa.  
Jones Superior Machine Co., Chicago  
Knickerbocker Co., Jackson, Mich.  
Leach Co., Oshkosh, Wis.  
Witte Engine Works, Kansas City, Mo.

## SAWS, PORTABLE POWER

\*Tousley Tool Co., Cleveland, Ohio  
Electric-Magneto Tool Co., Chicago  
Flexway Corp., Cincinnati, Ohio  
Ingersoll-Rand Co., New York  
Michel Electric Hand Saw Co., Chicago  
Porter Cable Machinery Co., Syracuse  
Reed-Prentice Corp., Worcester, Mass.  
F. L. Rogers & Co., Chicago  
Skilaw, Inc., Chicago, Ill.  
Wappat Gear Works, Pittsburgh, Pa.  
Witte Engine Works, Kansas City, Mo.

## SCARIFIERS

\*Austin-Western Road Machy. Co., Chicago  
\*Barber Asphalt Co., Philadelphia  
\*Buffalo-Springfield Roller Co., Springfield, O.  
\*Caterpillar Tractor Co., San Leandro, Cal.  
\*Good Roads Machy. Co., Kennett Sq., Pa.  
\*Huber Mfg. Co., Marietta, Ohio  
Acme Road Machinery Co., Frankfort, N. Y.  
Austin Mfg. Co., Chicago  
Banting Mfg. Co., Toledo, Ohio  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
Klausner Mfg. Co., Dubuque, Iowa  
Rome Mfg. Co., Rome, N. Y.  
Universal Road Machy. Co., Kingston, N. Y.

## SCARIFIERS, TEETH FOR

\*Caterpillar Tractor Co., San Leandro, Cal.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Shunk Mfg. Co., Bucyrus, Ohio

## SCOOPS, HORSE OR TRACTOR DRAWN (See Scrapers Drag, Scrapers, Rotary and Scrapers, Wheeled)

## SCOOPS, HAND (See Shovels, Spades and Scoops)

## SCOOPS, SKIMMER AND TRENCH

\*Bay City Shovels, Inc., Bay City, Mich.  
Keystone Driller Co., Beaver Falls, Pa.

## SCRAPERS, DRAG

\*Austin-Western Road Machinery Co., Chicago  
\*Caterpillar Tractor Co., San Leandro, Calif.  
Acme Road Machy. Co., Frankfort, N. Y.  
J. D. Adams & Co., Indianapolis, Ind.  
American Steel Scraper Co., Sidney, Ohio  
Beach Mfg. Co., Charlotte, Mich.  
Case Crane & Engg. Co., Columbus, Ohio  
Chattanooga Whilbrw Co., Chattanooga, Tenn.  
Deere & Co., Moline, Ill.  
Donaldson Bros. Mfg. Co., Clemens, Mich.  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Jackson Mfg. Co., Harrisburg, Pa.  
Sidney Steel Scraper Co., Sidney, Ohio  
Slusser-McLean Scraper Co., Sidney, Ohio  
Stockland Road Machinery Co., Minneapolis  
Toledo Wheelbarrow Co., Toledo, Ohio  
Western Wheeled Scraper Co., Aurora, Ill.

## SCRAPERS, FRESNO (See Scrapers, Rotary)

## SCRAPERS, DRAGLINE

\*General Wheelbarrow Co., Cleveland  
\*Garst Mfg. Company, Chicago  
\*Sauerman Bros., Chicago  
Beach Mfg. Co., Charlotte, Mich.  
Link-Belt Co., Chicago

## SCRAPERS, POWER DRAG

\*Beaumont Manufacturing Co., Philadelphia  
\*Garst Mfg. Company, Chicago  
\*L. F. Green, Chicago  
\*W. A. Riddell Co., Bucyrus, Ohio  
\*Sauerman Bros., Chicago  
\*Scheffeld-Burkett Constr. Co., Macon, Ga.  
Beach Mfg. Co., Charlotte, Mich.  
General Wheelbarrow Co., Cleveland

## SCRAPERS, ROAD (See also Drags, Road)

Rome Mfg. Co., Rome, N. Y.  
Root Spring Scraper Co., Kalamazoo, Mich.

## SCRAPERS, ROTARY

\*Austin-Western Road Machinery Co., Chicago  
\*Baker Mfg. Co., Springfield, Ill.  
\*Caterpillar Tractor Co., San Leandro, Calif.  
\*Euclid Crane & Hoist Co., Euclid Village, O.  
\*Killefer Mfg. Co., Los Angeles, Calif.  
\*Eoderick Loan Co., Mansfield, Ohio  
\*Gustav Schaefer Co., Cleveland, Ohio  
Adams & Co., J. D., Indianapolis, Ind.  
American Steel Scraper Co., Sidney, Ohio  
Atlas Scraper Co., Los Angeles, Calif.  
Beach Mfg. Co., Charlotte, Mich.  
Case Crane & Engg. Co., Columbus, Ohio  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, O.  
H. C. Shaw Co., Stockton, Calif.  
Sidney Steel Scraper Co., Sidney, Ohio  
Slusser-McLean Scraper Co., Sidney, Ohio  
Sollano Iron Works, Berkeley, Calif.  
Stockland Road Machy. Co., Minneapolis, Minn.  
General Wheelbarrow Co., Cleveland, Ohio  
Lyle Culvert & Road Equip. Co., Minneapolis  
Miskin Scraper Works, Ucon, Idaho  
Root Spring Scraper Co., Kalamazoo  
Sidney Steel Scraper Co., Sidney, O.  
Stockland Road Machinery Co., Minneapolis  
Western Wheeled Scraper Co., Aurora, Ill.

## SCRAPERS, SELF-LOADING (See Scrapers, Rotary and Scrapers, Wheeled)

## SCRAPERS, WHEELED

\*Austin-Western Road Machinery Co., Chicago  
\*Baker Mfg. Co., Springfield, Ill.  
\*Caterpillar Tractor Co., San Leandro, Calif.  
\*Euclid Crane & Hoist Co., Euclid Village, O.  
\*General Wheelbarrow Co., Cleveland  
\*W. A. Riddell Co., Bucyrus, Ohio  
Acme Road Machy. Co., Frankfort, N. Y.  
J. D. Adams & Co., Indianapolis, Ind.  
American Steel Scraper Co., Sidney, Ohio  
Atlas Scraper Co., Los Angeles, Calif.  
Beach Mfg. Co., Charlotte, Mich.  
Case Crane & Engg. Co., Columbus, Ohio  
C. D. Edwards Mfg. Co., Albert Lea, Minn.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa  
Miami Trailer Scraper Co., Troy, Ohio  
Miskin Scraper Works, Ucon, Ia.  
Sidney Steel Scraper Co., Sidney, Ohio  
Slusser-McLean Scraper Co., Sidney, Ohio  
H. C. Shaw Co., Stockton, Calif.  
Stockland Road Machy. Co., Minneapolis, Minn.  
Western Wheeled Scraper Co., Aurora, Ill.

## SCREENS, SAND, GRAVEL AND COAL

\*Allis-Chalmers Mfg. Co., Milwaukee.  
\*Austin-Western Road Machinery Co., Chicago  
\*Chicago Automatic Conv. Co., Chicago  
\*Good Roads Machy. Co., Kennett Sq., Pa.  
\*L. F. Green, Chicago  
\*Geo. Hains Mfg. Co., New York  
Acme Road Machinery Co., Frankfort, N. Y.  
Atlas Engineering Co., Milwaukee, Wis.  
Austin Mfg. Co., Chicago  
C. O. Bartlett & Snow Co., Cleveland, Ohio  
Beach Mfg. Co., Charlotte, Mich.  
Brown Hoisting Machy. Co., Cleveland, Ohio  
Chain Belt Co., Milwaukee, Wis.

Deister Concentrator Co., Ft. Wayne, Ind.  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Gifford-Wood Co., Hudson, N. Y.  
Hendrick Mfg. Co., Carbondale, Ohio  
Jeffrey Mfg. Co., Columbus, Ohio  
Link-Belt Co., Chicago  
Littleford Bros., Cincinnati, Ohio  
Lyle Culvert & Road Equipment Co., Minneapolis, Minn.  
Morrow Mfg. Co., Wellston, Ohio  
Newago Engineering Co., Newago, Mich.  
New Holland Machy. Co., New Holland, Pa.  
New Jersey Wire Cloth Co., Trenton, N. J.  
Robins Conv. Belt Co., New York  
H. B. Sackett Screen & Chute Co., Chicago  
Smith Engineering Works, Milwaukee, Wis.  
Universal Crusher Co., Cedar Rapids, Iowa  
Universal Road Machine Co., Kingston, N. Y.  
Webster Mfg. Co., Chicago  
Weller Mfg. Co., Chicago  
Wickwire Spencer Steel Co., New York

## SCREENS, SEWAGE

Dorr Co., New York  
Green Bay Fdry. & Mach. Wks., Green Bay, Wis.  
Link-Belt Co., Chicago  
Simplex Ejector & Aerator Corp., Chicago

## SEWAGE DISINFECTION

\*Wallace & Tiernan Co., Inc., Newark, N. J.  
Paradon Mfg. Co., Arlington, N. J.

## SEWAGE DISPOSAL APPARATUS

Dorr Co., New York  
Link-Belt Co., Chicago  
Pacific Flush Tank Co., Chicago and N. Y.  
Simplex Ejector & Aerator Corp., Chicago

## SEWAGE EJECTORS

Pacific Flush Tank Co., Chicago and N. Y.  
Simplex Ejector & Aerator Corp., Chicago  
Yeomans Bros. Co., Chicago

## SEWAGE PUMPS (See Pumps)

## SEWER BLOCKS, SEGMENT

American Vit. Products Co., Akron, Ohio  
Cannellton Sewer Pipe Co., Cannellton, Ind.  
Denver Sewer Pipe & Clay Co., Denver, Col.  
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.  
Evans & Howard Fire Brick Co., St. Louis, Mo.  
Laclede Christy Clay Prod. Co., St. Louis, Mo.  
Macomb Sewer Pipe Works, Macomb, Ill.  
Red Wing Sewer Pipe Co., Red Wing, Minn.  
Robinson Clay Products Co., Akron, Ohio  
Standard Fire Brick & Sewer Pipe Co., Pueblo, Col.

## SEWER BRACES

\*Templeton, Kenly & Co., Chicago

## SEWER CLEANING APPARATUS

F. Bissell Co., Toledo, Ohio  
Champion Corp., Hammond, Ind.  
Heppo Sewer Root Outter Co., Freeport, Ill.  
Self Propelling Nozzle Co., New York  
Turbine Sewer Machine Co., Milwaukee

## SEWER PIPE AND DRAIN TILE

American Vit. Products Co., Akron, Ohio  
Blackmer & Post Pipe Co., St. Louis  
William E. Dee Co., Chicago  
Denver Sewer Pipe & Clay Co., Denver, Colo.  
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.  
Evans & Howard Fire Brick Co., St. Louis  
Logan Clay Products Co., Logan, Ohio  
Ohio Vit. Pipe Co., Uhrichsville, Ohio  
Patton Clay Mfg. Co., Patton, Pa.  
Red Wing Sewer Pipe Co., Red Wing, Minn.  
Robinson Clay Prod. Co., Akron, Ohio  
Streator Clay Mfg. Co., Streator, Ill.

## SEWER PIPE FORMS (See Forms, Concrete Pipe)

## SEWER PIPE JOINT COMPOUNDS

Atlas Mineral Prod. Co., Martintown, Pa.  
Pacific Flush Tank Co., Chicago and N. Y.  
Rubercoid Co., New York  
Servicised Products Corp., Chicago  
Conc. Form Co., Inc., Syracuse, N. Y.  
Quinn Wire & Iron Works, Boone, Iowa

## SEWER RODS

F. Bissell Co., Toledo, Ohio  
Champion Corp., Hammond, Ind.  
Turbine Sewer Machine Co., Milwaukee



The  
**ACCEPTED STANDARD**  
in  
**WIRE ROPE QUALITY**

In the use of Wire Rope it is important to **KNOW FOR A CERTAINTY** the quality of Wire Rope put into service.

Williamsport standard of Quality, due to their superior process of manufacture and competitive tests has caused prominent engineers to accept it as *Standard*.

The Telfax Tape System of grade marking—woven into the core of each grade of rope—factory certification—is absolute proof of tensile strength, a protection worth more than the price of the rope.

*Send for literature and prices*

## **WILLIAMSPORT WIRE ROPE COMPANY**

*Main Office and Works*  
**WILLIAMSPORT, PA.**

*General Sales Office*  
**PEOPLES GAS BLDG., CHICAGO**

# Where to Purchase

## SHARPENERS, DRILL STEEL

\*Sullivan Machinery Co., Chicago  
 Gardner-Denver Co., Quincy, Ill.  
 Hardacog Wonder Drill Co., Ottumwa, Iowa  
 Ingersoll-Rand Co., New York

## SHORES

Concrete Engineering Co., Omaha, Neb.  
 Dayton Sure Grip & Shore Co., Dayton, Ohio  
 Fischer & Hayes Rope & Steel Co., Chicago  
 M. & M. Wire Clamp Co., Minneapolis  
 The O. D. G. Co., Owensboro, Ky.  
 H. W. Ross Co., Cincinnati, Ohio  
 Ross-Meyer-Hecht Co., Cincinnati, Ohio  
 Symons Clamp & Mfg. Co., Chicago  
 Universal Form Clamp Co., Chicago

## SHOVELS, CRAWLING TRACTOR

\*Bucyrus-Erie Co., Erie, Pa.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*The Shovel Co., Lorain, Ohio  
 \*Trackson Co., Milwaukee  
 American Hoist & Derrick Co., St. Paul  
 Ohio Power Shovel Co., Lima, O.  
 Speeder Mch. Corp., Cedar Rapids, Iowa

## SHOVELS, ELECTRIC

\*Bay City Shovels, Inc., Bay City, Mich.  
 \*Bucyrus-Erie Co., Erie, Pa.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Kochring Co., Milwaukee, Wis.  
 \*Osgood Company, Marion, Ohio  
 \*The Shovel Co., Lorain, Ohio  
 American Hoist & Derrick Co., St. Paul  
 Byers Mach. Co., Ravenna, Ohio  
 Link-Belt Co., Chicago  
 Marion Steam Shovel Co., Marion, Ohio  
 Ohio Power Shovel Co., Lima, O.  
 Speeder Mch. Corp., Cedar Rapids, Iowa

## SHOVELS, GASOLINE

\*Bay City Shovels, Inc., Bay City, Mich.  
 \*Bucyrus-Erie Co., Erie, Pa.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Insley Mfg. Co., Indianapolis  
 \*Kochring Co., Milwaukee, Wis.  
 \*Osgood Company, Marion, Ohio  
 \*The Shovel Co., Lorain, Ohio  
 \*Trackson Co., Milwaukee  
 American Hoist & Derrick Co., St. Paul  
 American Steel Dredge Co., Ft. Wayne, Ind.  
 Austin Machine Corp., Muskegon, Mich.  
 Byers Mach. Co., Ravenna, Ohio  
 General Excavator Co., Marion, Ohio  
 Harnischfeger Corp., Milwaukee, Wis.  
 Keystone Driller Co., Beaver Falls, Pa.  
 Link-Belt Co., Chicago  
 Marion Steam Shovel Co., Marion, Ohio  
 McMyler Interstate Co., Cleveland, Ohio  
 Mead-Morrison Mfg. Co., Boston  
 Northwest Engineering Works, Chicago  
 Ohio Power Shovel Co., Lima, O.  
 Orton Crane & Shovel Co., Chicago  
 Speeder Mch. Corp., Cedar Rapids, Iowa  
 Star Drilling Machine Co., Akron, Ohio  
 Universal Power Shovel Co., Highland Park, Mich.

## SHOVELS, STEAM

\*Bucyrus-Erie Co., Erie, Pa.  
 \*Industrial Brownhoist Corp., Cleveland  
 \*Osgood Company, Marion, Ohio  
 \*The Shovel Co., Lorain, Ohio  
 American Hoist & Derrick Co., St. Paul  
 Marion Steam Shovel Co., Marion, Ohio  
 Orton Crane & Shovel Co., Chicago  
 Keystone Driller Co., Beaver Falls, Pa.

## SHOVELS, SPADES AND SCOOPS

American Mfg. Co., Chattanooga, Tenn.  
 Ames Shovel & Tool Co., Boston  
 Baldwin Tool Works, Parkersburg, W. Va.  
 Beall Bros. Co., Alton, Ill.  
 Conneant Shovel Co., Conneant, Ohio  
 Indiana Shovel Co., New Castle, Ind.  
 Jackson Shovel Co., Montpelier, Ind.  
 Pittsburgh Shovel Co., Pittsburgh, Pa.  
 Wood Shovel & Tool Co., Piqua, Ohio  
 Wyoming Shovel Works, Wyoming, Pa.

## SIDEWALK AND ROAD FORMS (See Forms, Concrete)

## SIGNS, STREET AND ROAD

Alumoyd Sign & Signal Co., Chicago  
 Auto Sign Display Co. of Missouri, St. Louis, Mo.  
 Baltimore Easman & Novelty Co., Baltimore  
 Elkhart Foundry & Machine Co., Elkhart, Ind.  
 Evern-Century Sign Co., Boston  
 Ingram-Richardson Mfg. Co., Beaver Falls, Pa.  
 A. D. Joslin Mfg. Co., Manistee, Mich.  
 Lyle-Signs, Minneapolis, Minn.  
 Municipal Street Sign Co., New York  
 Niles Machine Co., Lebanon, N. H.  
 Persons-Majestic Mfg. Co., Worcester, Mass.  
 Reddix Signal Co., Cleveland, Ohio

Rochester Street Signal Co., Rochester, N. Y.  
 Standard Mfg. Co., Cedar Falls, Iowa  
 Union Iron Products Co., E. Chicago, Ind.  
 Western Stamping & Mfg. Co., St. Paul

## SLEEVES, TAPPING AND VALVE

Mueller Company, Decatur, Ill.  
 Renascator Valve Co., Troy, N. Y.  
 A. P. Smith Mfg. Co., East Orange, N. J.

## SLUICE GATES (See Gates, Sluice)

## SMOKE STACKS (See Chimneys, Steel)

## SNOW REMOVAL MACHINERY

\*Allis-Chalmers Mfg. Co., Springfield, Ill.  
 \*Austin-Western Road Machinery Co., Chicago  
 \*Baker Mfg. Co., Springfield, Ill.  
 \*Barber-Greene Co., Aurora, Ill.  
 \*Caterpillar Tractor Co., San Leandro, Cal.  
 \*Cleveland Tractor Co., Cleveland, Ohio  
 \*Good Roads Machinery Co., Kennett Sq., Pa.  
 \*George Halse Mfg. Co., New York  
 \*Killefer Mfg. Co., Los Angeles, Calif.  
 \*N. P. Nelson Co., Passaic, N. J.  
 \*W. A. Riddell Co., Bucyrus, Ohio  
 \*Trackson Co., Milwaukee, Wis.  
 Austin Mfg. Co., Chicago  
 Byers Mach. Co., Ravenna, Ohio  
 C. D. Edwards Mfg. Co., Albert Lea, Minn.  
 Fox Rotary Snow Broom Co., New York  
 Carl H. Frink, Thousand Islands, N. Y.  
 The Heil Company, Milwaukee, Wis.  
 Klauer Mfg. Co., Dubuque, Iowa  
 LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa  
 Mack Trucks, Inc., New York  
 Maine Steel Products Co., Portland, Me.  
 Mead-Morrison Mfg. Co., E. Boston  
 New England Road Machy. Co., So. Boston, Mass.  
 Owensboro Ditcher & Grader Co., Owensboro, Ky.  
 Rotary Snow Plow Co., Minneapolis  
 Walsh's Holyoke St. Bkr. Works, Holyoke, Mass.  
 Walter Snow Fighters, L. I. City, N. Y.  
 Wausau Iron Wks., Wausau, Wis.

## SNOW FENCING

\*Good Roads Machinery Co., Kennett Sq., Pa.  
 American Fence Const. Co., New York  
 Wickwire-Spencer Steel Co., New York

## SPADES (See Shovels)

## SPRATERS, ASPHALT AND TAR

Kinney Mfg. Co., Boston  
 Littleford Bros., Cincinnati

## SPRAYING MACHINERY FOR TREES

John Bean Mfg. Co., Lansing, Mich.  
 Deming Co., Salem, Ohio  
 Field Force Pump Co., Elmira, N. Y.  
 Fitzhenry-Guptill Co., E. Cambridge, Mass.  
 Friend Mfg. Co., Gasport, N. Y.  
 Hardie Mfg. Co., Hudson, Mich.

## SPRAY PAINTING MACHINERY (See Painting Machinery)

## SPREADERS, SAND

\*Good Roads Machy. Co., Kennett Square, Pa.  
 \*Warren Bros. Co., Boston, Mass.  
 Goroco Mechanical Spreader Co., Philadelphia  
 Highway Service Co., New Bedford, Mass.  
 Tarrant Co., Saratoga Springs, N. Y.

## SPREADERS, STONE

\*Austin-Western Road Machinery Co., Chicago  
 \*The Burch Corp., Crestline, Ohio  
 Gallion Iron Works & Mfg. Co., Gallion, Ohio  
 Shaw-Enoch Tractor Co., Minneapolis  
 Universal Road Machinery Co., Kingston, N. Y.

## STACKS, STEEL

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Connery & Co., Inc., Philadelphia  
 \*Heltzel Steel Form & Iron Co., Warren, Ohio  
 \*Joseph Henhorst Co., Cincinnati, Ohio  
 Birmingham Tank Co., Birmingham, Ala.  
 Canton Art Metal Co., Canton, Ohio  
 Chattanooga Boiler & Tank Co., Chattanooga, Tenn.  
 Chicago Bridge & Iron Works, Chicago  
 Graver Corp., Chicago  
 Heil Co., Milwaukee, Wis.  
 Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
 Lancaster Iron Works, Lancaster, Pa.  
 Littleford Bros., Cincinnati, Ohio  
 New York Central Iron Works Co., Inc., Hagerstown, Md.  
 Tippet & Wood, Phillipsburg, Pa.  
 Petroleum Iron Works Co., Sharon, Pa.  
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
 W. B. Sealife & Sons, Pittsburgh, Pa.

## STANDPIPES AND ELEVATED TANKS

W. E. Caldwell Co., Louisville, Ky.  
 Chatta. Bkr. & Tank Co., Chattanooga, Tenn.  
 Chicago Bridge & Iron Works, Chicago  
 R. D. Cole Mfg. Co., Newnan, Ga.  
 Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
 Lancaster Iron Works, Lancaster, Pa.  
 Pacific Tank & Pipe Co., San Francisco  
 Petroleum Iron Works Co., Sharon, Pa.  
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
 J. S. Schofield's Sons Co., Macon, Ga.  
 Tippet & Wood, Phillipsburg, Pa.  
 United Iron Works, Inc., Kansas City, Mo.

## STEAM SHOVELS (See Shovels, Steam)

## STEEL PLATE CONSTRUCTION

\*Blaw-Knox Co., Pittsburgh, Pa.  
 \*Connery & Co., Philadelphia  
 \*Heltzel Steel Form & Iron Co., Warren, Ohio  
 \*Joseph Henhorst Co., Cincinnati, Ohio  
 \*Union Iron Works, Hokenen, N. J.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Biggs Boiler Works, Akron, Ohio  
 Birmingham Tank Co., Birmingham, Ala.  
 Chatta. Boiler & Tank Co., Chattanooga, Tenn.  
 Chicago Bridge & Iron Works, Chicago  
 Graver Corp., East Chicago, Ill.  
 Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
 Heil Co., Milwaukee, Wis.  
 Hendrick Mfg. Co., Carbondale, Pa.  
 Lancaster Iron Works, Lancaster, Pa.  
 Littleford Bros., Cincinnati, Ohio  
 McClintic-Marshall Co., Pittsburgh, Pa.  
 New York Central Iron Works Co., Inc., Hagerstown, Md.  
 Pennsylvania Bridge Co., Beaver Falls, Iowa  
 Petroleum Iron Works Co., Sharon, Pa.  
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
 Ritter-Conley Co., Pittsburgh, Pa.  
 W. B. Sealife & Sons, Pittsburgh, Pa.

## STEEL SHEET PILING

\*Wemlinger, Inc., New York

## STEEL TOWERS, CONCRETE

\*Insley Mfg. Co., Indianapolis, Ind.  
 \*Lakewood Engr. Co., Cleveland, O.  
 \*Ransome Const. Machinery Co., Dunellen, N. J.

## STOKERS, MECHANICAL

Habcock & Wilcox Co., New York  
 Combustion Engineering Corp., New York  
 Dayton Stoker Co., Dayton, Ohio  
 Detroit Stoker Co., Detroit  
 Green Eng. Co., East Chicago, Ind.  
 Sanford Riley Stoker Co., Worcester, Mass.  
 Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

## STREET AND ROAD SIGNS (See Signs)

## STREET BROOMS

Kendallville Broom & Brush Co., Kendallville, Ind.  
 Joseph Lay Co., Portland, Ind.  
 Osborn Mfg. Co., Cleveland, Ohio

## STREET CLEANERS' CARTS

Durich Can & Iron Works, Brooklyn, N. Y.  
 Rochester Can Co., Rochester, N. Y.  
 Tarrant Mfg. Co., Saratoga Springs, N. Y.

## STREET FLUSHERS AND SPRINKLERS

\*Austin-Western Road Mch. Co., Chicago  
 Austin Mfg. Co., Chicago  
 Autocar Co., Ardmore, Pa.  
 E. D. Eytayre & Co., Oregon, Ill.  
 Federal Motor Truck Co., Detroit  
 Gallion Iron Works & Mfg. Co., Gallion, Ohio  
 General Motors Truck Co., Chicago  
 Heil Co., Milwaukee, Wis.  
 Charles Hesse & Co., New York  
 Kinney Mfg. Co., Boston  
 Mack Trucks, Inc., New York  
 Municipal Supply Co., South Bend, Ind.  
 White Co., Cleveland, Ohio  
 Whitehead & Kales Co., Detroit

## STREET LIGHTING EQUIPMENT

\*Nove Engine Co., Lansing, Mich.  
 American Conc. Prod. Co., Forest Park, Ill.  
 Chicago Conc. Prod. Co., Chicago  
 J. B. Clow & Sons, Chicago  
 Electric Ry. Equipment Co., Cincinnati, Ohio  
 Holophane Co., New York  
 King Mfg. Co., Chicago  
 Line Material Co., So. Milwaukee, Wis.  
 J. S. Schofield's Sons Co., Macon, Ga.  
 Union Metal Mfg. Co., Canton, Ohio  
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

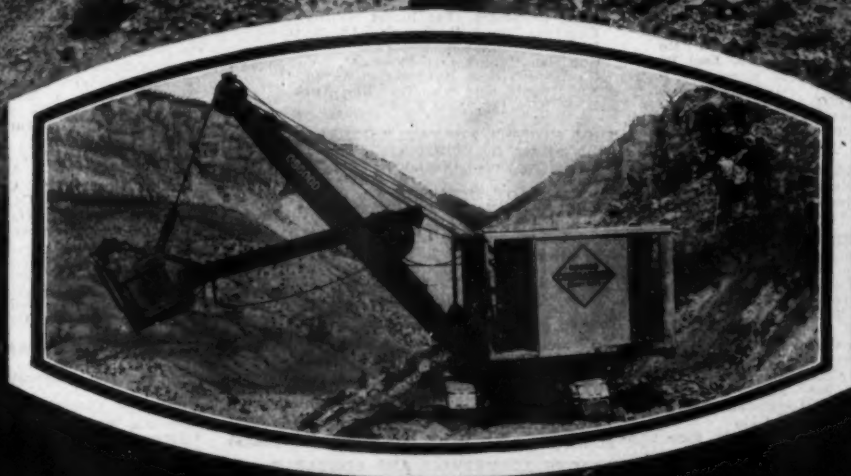
## STREET SIGNS (See Signs, Street)

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



# OSGOOD

## BLAZES THE TRAIL



Pioneering today just as they were half a century ago, Osgood blazes the trail to improved excavating machinery. With exclusive engineering features and new low records for operation and maintainance, Osgood leads the way and will continue to lead.

**THE OSGOOD CO.**  
MARION OHIO

# Where to Purchase

## STREET SWEEPERS

\*Austin-Western Road Mch. Co., Chicago  
Acme Road Machy. Co., Frankfort, N. Y.  
Austin Mfg. Co., Chicago  
Butler Mfg. Co., Cleveland, Ohio  
Elgin Sales Corp., New York  
Kinney Mfg. Co., Boston  
Whitehead & Kales Co., Detroit

## STREET SWEEPER BROOMS REFILLED

Kendallville Broom & Brush Co., Kendallville, Ind.  
Joseph Lay Co., Portland, Ind.  
Osborn Mfg. Co., Cleveland, Ohio  
Standard Brush & Broom Mfg. Co., Chicago

## STUMP PULLERS

\*Beebe Bros., Inc., Seattle, Wash.  
H. L. Bennett & Co., Westerville, Ohio  
Ersted Mfg. Co., Portland, Ohio  
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa  
John Waldron Corp., New Brunswick, N. J.

## SUBGRADING MACHINES

\*Blaw-Knox Co., Pittsburgh, Pa.  
\*Keehring Co., Milwaukee  
\*Lakewood Eng. Co., Cleveland, Ohio  
Ted Carr & Co., Chicago  
The Hug Co., Highland, Ill.  
Shaw-Enecha Tractor Co., Minneapolis

## SURFACERS & GRINDERS, CONCRETE

\*Touley Tool Co., Cleveland  
Chicago Pneumatic Tool Co., New York  
Cleveland Pneumatic Tool Co., Cleveland  
Concrete Surfacing Machy. Co., Cincinnati  
The Dallest Co., Philadelphia  
Ingersoll-Rand Co., New York

## SURVEYORS' INSTRUMENTS (See Instruments)

## SWITCHBOARDS

Allis-Chalmers Mfg. Co., Milwaukee  
General Electric Co., Schenectady, N. Y.  
Wagner Electric Mfg. Co., St. Louis, Mo.  
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

## TAMPERS, PNEUMATIC

\*Independent Pneumatic Tool Co., Chicago, Ill.  
Chicago Pneumatic Tool Co., New York  
Ingersoll-Rand Co., New York

## TAMPING MACHINES, CONCRETE BLOCK

Cement Block Machinery Co., Newark, N. J.  
Sagelmeyer Cast Stone Block Mch. Co., Bay City, Mich.

## TANKS, AIR COMPRESSOR

\*Convery & Co., Inc., Philadelphia  
Biggs Boiler Works, Akron, Ohio  
Birmingham Tank Co., Birmingham, Ala.  
Chicago Bridge & Iron Works, Chicago  
Chicago Pneumatic Tool Co., New York  
Curtis Press. Mch. Co., St. Louis, Mo.  
Graver Corp., East Chicago, Ind.  
Heil Co., Milwaukee, Wis.  
Indiana Air Pump Co., Indianapolis  
Ingersoll-Rand Co., New York  
Lancaster Iron Works, Lancaster, Pa.  
Littleford Bros., Cincinnati, Ohio  
Nagle Engine & Boiler Works, Erie, Pa.  
National Tube Co., Pittsburgh, Pa.  
Petroleum Iron Works Co., Sharon, Pa.  
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
W. B. Scaife & Sons, Pittsburgh, Pa.  
Westinghouse Tract. Brake Co., Wilmerding, Pa.  
Worthington Pump & Mch. Co., New York

## TANKS, STEEL

\*Columbian St. Tank Co., Kansas City, Mo.  
\*Convery & Co., Philadelphia  
\*Joseph Henckels Co., Cincinnati, Ohio  
Bausman Mfg. Co., Millersville, Pa.  
Biggs Boiler Works, Akron, Ohio  
Birmingham Tank Co., Birmingham, Ala.  
S. F. Bowser & Co., Inc., Ft. Wayne, Ind.  
Butler Mfg. Co., Minneapolis, Minn.  
J. I. Case Threshing Machine Co., Racine, Wis.  
W. E. Caldwell Co., Louisville, Ky.  
Canton Art Metal Co., Canton, Ohio  
Chattanooga Boiler & Tank Co., Chattanooga, Tenn.  
Chicago Bridge & Iron Works, Chicago  
Dover Boiler Works, New York  
Edwards Mfg. Co., Cincinnati, O.  
Farrell Mfg. Co., Joliet, Ill.  
C. C. Fouts Co., Middletown, Ohio  
Graver Corp., E. Chicago, Ind.  
R. Hardesty Mfg. Co., Denver, Colo.  
Int'l Comb. Eng. Corp., Chattanooga, Tenn.  
Heil Co., Milwaukee, Wis.  
Hendrick Mfg. Co., Carbondale, Pa.  
Lancaster Iron Works, Lancaster, Pa.  
Littleford Bros., Cincinnati, Ohio  
Nagle Eng. & Boiler Works, Erie, Pa.  
New York Central Iron Works Co., Hagers-town, Md.  
Pacific Tank & Pipe Co., San Francisco  
Petroleum Iron Works Co., Sharon, Pa.

Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
Ritter-Conley Co., Pittsburgh, Pa.  
W. B. Scaife & Sons, Pittsburgh  
United Iron Works, Inc., Kansas City, Mo.

## TANKS, WOOD

W. E. Caldwell Co., Louisville, Ky.  
G. M. Davis & Son, Palatka, Fla.  
Eagle Tank Co., Chicago  
Hauser-Stander Tank Co., Cincinnati, Ohio  
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.  
National Tank & Pipe Co., Portland, Ore.  
Pacific Tank & Pipe Co., San Francisco  
Redwood Mfrs. Co., San Francisco  
A. T. Stearns Lumber Co., Boston  
U. S. Wind Eng. & Pump Co., Batavia, Ill.  
Wendnagel & Co., Chicago

## TAPES, STEEL AND METALLIC

Eugene Dietgen Co., New York  
Keuffel & Esser Co., Hoboken, N. J.  
Lufkin Rule Co., Saginaw, Mich.  
The L. S. Starrett Co., Athol, Mass.

## TAR

\*Barrett Co., New York  
American Tar Products Co., Pittsburgh, Pa.

## TAR KETTLES (See Kettles)

## THAWING OUTFITS

\*Chausse Oil Burner Co., Elkhart, Ind.  
Aeroll Burner Co., West New York, N. J.  
Littleford Bros., Cincinnati  
Hauk Mfg. Co., Brooklyn, N. Y.

## TIES, STEEL

Carnegie Steel Co., Pittsburgh, Pa.  
International Steel Tie Co., Cleveland, O.  
Koppel Ind. Car & Equipment Co., Koppel, Pa.  
Sweet's Steel Co., Williamsport, Pa.

## TIRES, RUBBER (For Motor Trucks)

Firestone Tire & Rubber Co., Akron, O.  
Fisk Tire Co., Chicopee Falls, Mass.  
Goodrich Rubber Co., Akron, O.  
Goodyear Tire & Rubber Co., Akron, O.  
Kelly Springfield Tire Co., New York  
U. S. Tire Co., New York

## TOOL HOUSES, PORTABLE STEEL

\*Blaw-Knox Co., Pittsburgh, Pa.  
Littleford Bros., Cincinnati, Ohio

## TORCHES, OIL HEATING

\*Chausse Oil Burner Co., Elkhart, Ind.  
\*Convery & Co., Philadelphia, Pa.  
Hauk Mfg. Co., Brooklyn, N. Y.  
Hoosier Paint Works, Ft. Wayne, Ind.  
Littleford Bros., Cincinnati  
Mead-Morrison Mfg. Co., East Boston, Mass.  
Alex Millburn Co., Baltimore, Md.  
Sewall Paint & Varnish Co., Kansas City, Mo.  
Sherwin-Williams Co., Cleveland, O.  
Tropical Paint & Oil Co., Cleveland, O.  
Truscon Laboratories, Detroit, Mich.

## TORCHES, WELDING

\*Toledo Pressed Steel Co., Toledo, Ohio  
McCloskey Torch Co., Toledo, Ohio

## TOWERS (See Standpipes and Elevated Tanks)

## TRACKS, INDUSTRIAL AND PORTABLE

\*Lakewood Eng. Co., Cleveland, O.  
Atlas Car & Mfg. Co., Cleveland, O.  
Bethlehem Steel Co., Bethlehem, Pa.  
Chase Foundry & Mfg. Co., Columbus, O.  
Easton Car & Construction Co., Easton, Pa.  
C. W. Hunt Co., Inc., W. N. Brighton, N. Y.  
Koppel Ind. Car & Equipment Co., Koppel, Pa.  
Sweet's Steel Co., Williamsport, Pa.

## TRACTION TREADS (See Treads, Traction)

## TRACTORS

\*Allis-Chalmers Mfg. Co., Milwaukee  
\*Atlas Engineering Co., Clintonsville, Wis.  
\*Caterpillar Tractor Co., St. Leandre, Calif.  
\*Cleveland Tractor Co., Cleveland, O.  
\*Huber Mfg. Co., Marion, O.  
\*International Harvester Co., Chicago  
\*John Lunsford Co., New Holstein, Wis.  
\*W. A. Hiddell Co., Bucyrus, O.  
\*Rogers Bros. Corp., Albion, Pa.  
Advance-Rumely Thresher Co., Laporte, Ind.  
Bates Mfg. Co., Joliet, Ill.  
J. I. Case Threshing Machine Co., Racine, Wis.  
Electric Wheel Co., Quincy, Ill.  
Emerson-Brantingham, Rockford, Ill.  
Hart-Parr Co., Charles City, Ia.  
Lombard Tractor & Truck Corporation, N. Y.  
Mack Trucks, Inc., New York  
Mead-Morrison Mfg. Co., E. Boston  
Minneapolis Steel & Mach. Co., Minneapolis  
Shaw-Enecha Tractor Co., Minneapolis  
Wehr Co., Milwaukee

## TRACTOR HITCHES

\*Gustav Schaefer Co., Cleveland  
Trail-IT Co., St. Paul, Minn.  
Whitehead & Kales Co., Detroit

## TRAFFIC LINE MARKING MACHINES

Carrara Paint Co., Cleveland, O.  
Continental Prod. Co., Euclid, O.  
Line-O-Graph Co., N. Y.  
Littleford Bros., Cincinnati, Ohio

## TRAFFIC PAINT

J. E. Bauer Co., Los Angeles, Cal.  
Continental Prod. Co., Euclid, O.  
E. I. du Pont de Nemours & Co., Wilmington, Del.  
Hoosier Paint Wks., Ft. Wayne, Ind.  
Hanline Bros., Baltimore, Md.  
Tropical Paint & Oil Co., Cleveland, O.

## TRAFFIC PLATES

Alan Wood Iron & Steel Co., Philadelphia  
American Pressed Steel Co., Philadelphia  
Central Iron & Steel Co., Harrisburg, Pa.

## TRAFFIC SIGNAL EQUIPMENT

\*Toledo Pressed Steel Co., Toledo, Ohio  
Acme Traffic Signal Co., Chicago  
Alumoyd Sign & Signal Co., Chicago  
Amer. Gas Accumulator Co., Elizabeth, N. J.  
Auto Sign Display Co. of Mo., St. Louis, Mo.  
Cretney Traffic Guide Co., Madison, Wis.  
Crouse-Hinds Co., Syracuse, N. Y.  
Eagle Signal Sales Corp., Moline, Ill.  
Esaco Mfg. Co., Peoria, Ill.  
Evernu-Century Sign Co., Boston  
Griswold Safety Signal Co., Minneapolis  
Horn Signal Mfg. Corporation, Newark, N. J.  
Line Material Co., South Milwaukee, Wis.  
Little Giant Co., Mankato, Minn.  
Lyle-Signs, Minneapolis, Minn.  
Rochester Street Signal Co., Rochester, N. Y.  
Tobacco Oil Tank & Pump Co., Ft. Wayne, Ind.  
Traffic Equipment Corp., N. Y.  
Union Iron Prod. Co., E. Chicago, Ind.  
Welsbach Traffic Signal Co., Philadelphia

## TRAILERS FOR TRUCKS AND TRACTORS

\*Electric Wheel Co., Quincy, Ill.  
\*Euclid Crane & Hoist Co., Euclid, O.  
\*Highway Trailer Co., Edgerton, Wis.  
\*Rogers Bros. Corporation, Albion, Pa.  
\*Gustav Schaefer Co., Cleveland  
Arcadia Trailer Corporation, Newark, N. J.  
Detroit Trailer & Mach. Co., Detroit  
Eagle Wagon Works, Auburn, N. Y.  
Easton Car & Construction Co., Easton, Pa.  
Fremont Trailer Co., Detroit, Mich.  
Hercules Trailer Mfg. Co., Los Angeles  
Imperial Mach. Co., Minneapolis  
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa  
Lee Trailer & Body Co., Chicago  
Little Red Wagon Mfg. Co., Omaha  
Miami Trailer-Scaper Co., Troy, O.  
Muskegon Iron Wks., Muskegon, Mich.  
Smith Trailer Corp., Syracuse, N. Y.  
Trailmobile Co., Cincinnati  
Troy Trailer & Wagon Co., Troy, O.  
Warner Mfg. Co., Beloit, Wis.  
Whitehead & Kales Co., Detroit

## TRAILERS, HEAVY MACHINERY

\*Highway Trailer Co., Edgerton, Wis.  
\*Rogers Bros. Corporation, Albion, Pa.

## TRAILERS, INDUSTRIAL

\*Electric Wheel Co., Quincy, Ill.  
\*Highway Trailer Co., Edgerton, Wis.  
\*Lakewood Eng. Co., Cleveland, O.  
\*Rogers Bros. Corporation, Albion, Pa.  
\*Gustav Schaefer Co., Cleveland  
Chase Fdry. & Mfg. Co., Columbus, O.  
Clark Tractor Co., Battle Creek, Mich.  
Detroit Trailer & Machinery Co., Detroit  
Easton Car & Construction Co., Easton, Pa.  
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa  
Lee Trailer & Body Co., Plymouth, Ind.  
Miami Trailer-Scaper Co., Troy, O.  
Trailmobile Co., Cincinnati  
Whitehead & Kales Co., Detroit

## TRAILER COUPLINGS

\*Gustav Schaefer Co., Cleveland  
Trail-IT Co., St. Paul, Minn.

## TRAMWAYS, AERIAL WIRE ROPE

(See Aerial Wire Rope Tramways)

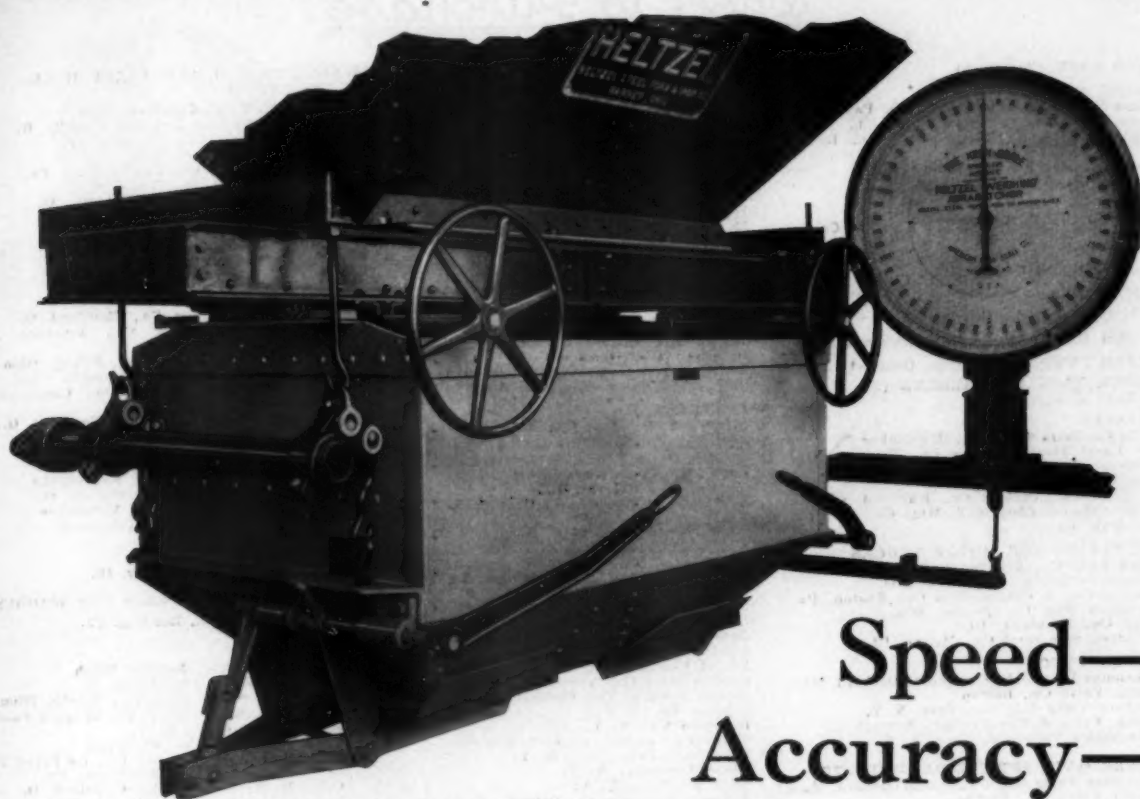
## TRANSFORMERS

\*Allis-Chalmers Mfg. Co., Milwaukee  
Duncan Elec. Mfg. Co., Lafayette, Ind.  
Enterprise Elec. Co., Warren, O.  
General Elec. Co., Schenectady, N. Y.  
Kuhlman Elec. Co., Bay City, Mich.  
Maloney Electric Co., St. Louis, Mo.  
Packard Electric Co., Warren, O.  
Pittsburgh Trans. Co., Pittsburgh, Pa.  
Wagner Elec. Corp., St. Louis, Mo.  
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

## TRANSITS AND LEVELS (See Instruments)

## TRANSMISSION MACHINERY, POWER

\*Allis-Chalmers Mfg. Co., Milwaukee  
Chain Belt Co., Milwaukee  
Dodge Mfg. Corp., Mishawaka, Ind.  
Kent Machine Co., Kent, O.  
Link-Belt Co., Chicago  
Webster Mfg. Co., Chicago  
Weller Mfg. Co., Chicago



Speed—  
Accuracy—

*You Get Both*  
**With HELTZEL Weighing Plants**

With a big 3 foot dial directly in front of the operator, he can see instantly every pound as it registers.

There is no time lost waiting for beam to balance—no complicated mechanism to get out of order—dirt and dust cannot get to working parts—accuracy is assured.

One contractor kept 2—27 E pavers going constantly on an 18-foot road, 9 inches deep and 11 miles long. There were no trucks jammed at the plant—they were loaded and out before the next truck could get into position.

If you are not fully acquainted with the many advantages of this Heltzel Weighing Plant, get in touch with us immediately. The coupon will bring you all the facts.

*We Also Build*

steel forms for streets, curb, sidewalk, curb and gutter, manholes, concrete pipe, steel bins, street joint, measuring hoppers, volume and weighing type, bridges, bulkheads, sub grade testers, trail graders, motor boxes, etc.

**HELTZEL STEEL FORM & IRON CO., Warren, Ohio**

Send us proof of Speed, Accuracy and Dependability of the Heltzel Weighing Plant

Name.....

Address.....

City .....

CEM 8-29



# Where to Purchase

## TRASH CANS (See Cans)

## TREADS, SAFETY

\*Blaw-Knox Company, Pittsburgh, Pa.  
American Abrasive Metals Co., N. Y.  
American Mason Safety Tread Co., Lowell, Mass.  
Concrete Steel Co., N. Y.  
Norton Co., Worcester, Mass.

## TREADS, TRACTION

\*Caterpillar Tractor Co., San Leandro, Cal.  
\*Trackson Co., Milwaukee  
Belle City Mfg. Co., Racine, Wis.  
Cropper Wheel Co., Reading, Pa.  
Electric Wheel Co., Quincy, Ill.  
Tractor Grip Wheel Co., Toledo, O.  
Whitehead & Kalos Co., Detroit

## TRENCH EXCAVATORS (See Excavators)

## TRENCH PUMPS (See Pumps, Contractors')

## TRUCKS, TANK & SPRINKLER (See Wagons, Tank & Sprinkler)

## TURBINES

Allis-Chalmers Mfg. Co., Milwaukee  
De Laval Steam Turbine Co., Trenton, N. J.  
General Electric Co., Schenectady, N. Y.  
Ingersoll-Rand Co., N. Y.  
Terry Steam Turbine Co., Hartford, Conn.  
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

## TURNABLES FOR MOTOR TRUCKS

\*Blaw-Knox Co., Pittsburgh, Pa.  
Champion Engine Co., Kenton, O.  
Easton Car & Construction Co., Easton, Pa.  
Freeman Mfg. Co., Racine, Wis.  
Hug Co., Highland, Ill.  
Western Structural Co., Moline, Ill.

## VALVES, CHECK

Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Coffin Valve Co., Boston  
Ladlow Valve Mfg. Co., Troy, N. Y.  
Mich. Valve & Foundry Co., Detroit  
Rensselaer Valve Co., Troy, N. Y.

## VALVES, GATE AND INDICATOR POSTS

Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Coffin Valve Co., Boston  
Columbian Iron Works, Chattanooga, Tenn.  
Crane Company, Chicago  
Darling Valve & Mfg. Co., Williamsport, Pa.  
Eddy Valve Co., Watford, N. Y.  
Iowa Valve Co., Oskaloosa, Ia.  
Kennedy Valve Mfg. Co., Elmira, N. Y.  
Ladlow Valve Mfg. Co., Troy, N. Y.  
Michigan Valve & Fdry. Co., Detroit  
Rensselaer Valve Co., Troy, N. Y.  
A. P. Smith Mfg. Co., E. Orange, N. J.  
Watrous Co., St. Paul  
R. D. Wood & Co., Philadelphia

## VALVES FOR GASOLINE ENGINES

\*Industrial Engine Parts Co., Inc., Cleveland

## VALVES, RELIEF

\*Neptune Meter Co., New York

## VALVES, TAPPING

Eddy Valve Co., Watford, N. Y.  
Hays Mfg. Co., Erie, Pa.  
Kennedy Valve Mfg. Co., Elmira, N. Y.  
Ladlow Valve Co., Troy, N. Y.  
Michigan Valve & Foundry Co., Detroit  
Rensselaer Valve Co., Troy, N. Y.  
Watrous Co., St. Paul  
A. P. Smith Mfg. Co., E. Orange, N. J.

## VALVE BOXES AND HOUSINGS

\*Central Foundry Co., N. Y.  
Chapman Valve Mfg. Co., Indian Orchard, Mass.  
H. W. Clark Co., Matteson, Ill.  
J. B. Clow & Sons, Chicago  
Columbian Iron Works, Chattanooga, Tenn.  
Darling Valve & Mfg. Co., Williamsport, Pa.  
Eddy Valve Co., Watford, N. Y.  
Iowa Valve Co., Oskaloosa, Ia.  
Kennedy Valve Mfg. Co., Elmira, N. Y.  
Ladlow Valve Mfg. Co., Troy, N. Y.  
Mueller Co., Decatur, Ill.  
Rensselaer Valve Co., Troy, N. Y.  
A. P. Smith Mfg. Co., E. Orange, N. J.  
Watrous Co., St. Paul  
R. D. Wood & Co., Philadelphia

## VOTING EQUIPMENT FOR CITIES

Automatic Registering Machine Co., Jamestown, N. Y.  
Ideal Voting Booth Co., Sullivan, Ind.  
Douglas Manufacturing Co., Crete, Nebr.  
Pennsylvania Construction Co., Marietta, Pa.  
Korff Manufacturing Co., Lansing, Mich.  
Van Dorn Iron Works Co., Cleveland, O.

## WAGONS (See Dump Carts and Wagons)

## WAGON BODIES (See Dump Bodies)

## WAGON LOADERS (See Loaders, Gravel)

## WAGONS & TRUCKS, TANK & SPRINKLER

\*Joseph Houbert Co., Cincinnati, O.  
Acme Road Machinery Co., Frankfort, N. Y.

Butler Mfg. Co., Minneapolis, Minn.  
J. I. Case Threshing Machine Co., Racine  
Gallon Iron Works & Mfg. Co., Gallon, Ohio  
Hill Co., Milwaukee, Wis.  
Mack Trucks, Inc., New York

## WALL TIES

Berger Mfg. Co., Canton, O.  
Concrete Steel Co., N. Y.  
Consolidated Exp. Metal Co., Wheeling, W. Va.  
Hawley Mfg. Co., Chicago  
M. & M. Wire Clamp Co., Minneapolis  
Milwaukee Corr. Co., Milwaukee, Wis.  
Niagara Metal Stamp Corp., Niagara Falls, N. Y.  
Wedgit Tie Co., Inc., New York

## WASHERS, SAND AND GRAVEL

\*Allis-Chalmers Mfg. Co., Milwaukee  
Jeffrey Mfg. Co., Columbus, O.  
Link-Belt Co., Chicago  
Smith Engineering Works, Milwaukee  
Stephens-Adamson Mfg. Co., Aurora, Ill.

## WATCHES, STOP

Sterling Stop Watch Co., New York

## WATER MAIN TAPPING MACHINES

Glauber Brass Mfg. Co., Cleveland  
Hays Mfg. Co., Erie, Pa.  
Mueller Co., Decatur, Ill.  
A. P. Smith Mfg. Co., E. Orange, N. J.

## WATER METERS (See Meters, Water)

## WATERPROOFING COMPOUNDS AND MATERIALS

\*Barber Asphalt Co., Philadelphia, Pa.  
\*Barrett Company, N. Y.  
\*Philip Carey Co., Cincinnati, O.  
\*Standard Oil Co. (Indiana), Chicago  
Anti-Hydro Waterproofing Co., Newark, N. J.  
Atlantic Refining & Asphalt Corp., Philadelphia  
Euclid Chemical Co., Cleveland  
Genfire Steel Co., Youngstown, O.  
Master Builders Co., Cleveland, O.  
Minwax Co., N. Y.  
Ruberoid Co., N. Y.  
Sandusky Cement Co., Cleveland, O.  
Sonneborn Sons, Inc., N. Y.  
Texas Company, N. Y.  
Toch Brothers, N. Y.  
Truscon Laboratories, Detroit, Mich.

## WATER PURIFICATION (See also Filters)

\*Wallace & Tiernan Co., Inc., Newark, N. J.  
Cochrane Corp., Philadelphia  
Paradon Mfg. Co., Arlington, N. J.  
K. U. V. Co., N. Y.

## WATER PURIFICATION CHEMICALS

Arnold Hoffman & Co., Inc., N. Y.  
E. I. du Pont de Nemours & Co., Wilmington, Del.  
Electro Bleaching Gas Co., N. Y.  
General Chemical Co., N. Y.  
Hooker Electrochemical Co., N. Y.  
Mathieson Alkali Works, Inc., N. Y.  
Pennsylvania Salt Mfg. Co., Philadelphia

## WATER SOFTENERS

American Water Softener Co., Philadelphia  
Cochrane Corp., Philadelphia  
Graver Corp., E. Chicago, Ind.  
International Filter Co., Chicago  
Permutit Co., N. Y.  
W. B. Seale & Sons, Pittsburgh, Pa.  
Wayne Tank & Pump Co., Ft. Wayne, Ind.

## WATER WASTE DETECTION

Empire Electric & Water Co., Inc., N. Y.  
Pitometer Co., N. Y.  
Simplex Valve & Meter Co., Philadelphia

## WATER WHEELS

\*Allis-Chalmers Mfg. Co., Milwaukee  
J. Leffel & Co., Springfield, O.  
I. P. Morris & De La Vergne, Inc., Hydr. Div., Philadelphia  
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.  
Pelton Water Wheel Co., San Francisco  
S. Morgan Smith Co., York, Pa.  
Worthington Pump & Machinery Corp., N. Y.

## WATER WORKS PUMPS (See Pumps)

## WEIGHING MACHINES

\*Conveying Weigher Co., N. Y.

## WELDING APPARATUS

\*Oxweld Acetylene Co., L. I. City, N. Y.  
Burke Electric Co., Erie, Pa.  
General Electric Co., Schenectady, N. Y.  
Lincoln Electric Co., Cleveland, O.  
MacLeod Co., Cincinnati, O.  
Alex. Milburn Co., Baltimore, Md.  
Smith's Inventions, Inc., Minneapolis, Minn.  
U. S. Light & Heat Corp., Niagara Falls  
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.  
Wilson Welder & Metals Co., Inc., Hoboken, N. J.

## WELLS, CONCRETE

Kelly Well Co., Grand Island, Neb.

## WELLS, GRAVEL WALL

Layne & Bowler, Inc., Memphis, Tenn.

## WELL-DRILLING AND BLAST HOLE MACHINES

\*The Burch Corp., Crestline, Ohio  
\*Sanderson Cyclone Drill Co., Orrville, O.  
Armstrong Mfg. Co., Waterloo, Ia.  
Burkhardt Co., Elkhart, Wis.  
Keystone Driller Co., Beaver Falls, Pa.  
Loomis Machine Co., Tiffin, O.  
Star Drilling Machine Co., Akron, O.

## WELL SCREENS

A. D. Cook, Inc., Lawrenceburg, Ind.  
E. E. Johnson, Inc., St. Paul, Minn.

## WHEELBARROWS

\*General Wheelbarrow Co., Cleveland, O.  
Ashboro Wheelbarrow Co., Ashboro, N. C.  
American Steel Scraper Co., Sidney, Ohio  
Case Crane & Engg. Co., Columbus, Ohio  
Chattanooga Wheelbarrow Co., Chattanooga, Tenn.  
Cleveland Wheelbarrow Co., Cleveland, O.  
Fairbanks Co., N. Y.  
Jackson Mfg. Co., Harrisburg, Pa.  
Lansing Co., Lansing, Mich.  
Puffer-Hubbard Mfg. Co., Minneapolis  
Sidney Steel Scraper Co., Sidney, O.  
Sterling Wheelbarrow Co., Milwaukee  
Toledo Wheelbarrow Co., Toledo, O.

## WHEELS FOR ALL USES

\*Electric Wheel Co., Quincy, Ill.

## WHEELS, CRAWLER TYPE FOR WAGONS

\*Cropper Wheel Co., Reading, Pa.

## WINCHES

\*Beebe Bros., Inc., Seattle, Wash.  
\*Brown Clutch Co., Sandusky, O.  
\*Glyde Iron Works Sales Co., Duluth, Minn.  
\*Dobbie Foundry & Mach. Co., Niagara Falls  
\*Mundy Sales Corp., N. Y.  
\*Gustav Schaefer Co., Cleveland  
Advance-Rumely Thresher Co., La Porte, Ind.  
Bethlehem Steel Co., Bethlehem, Pa.  
Chisholm-Moore Mfg. Co., Cleveland, O.  
Dake Engine Co., Grand Haven, Mich.  
Erted Mfg. Co., Portland, Ore.  
John T. Horton Co., New York  
Ingersoll Rand Co., New York  
Lidgerwood Mfg. Co., Elizabeth, N. J.  
Mead-Murphy Mfg. Co., E. Boston  
Muskegon Iron Wks., Muskegon, Okla.  
Stephens-Adamson Mfg. Co., Aurora, Ill.  
Street Bros. Mach. Works, Chattanooga

## WINDOW FRAMES AND SASH (Metallic)

\*Truscon Steel Co., Youngstown, O.  
Wm. Bayley Co., Springfield, O.  
Detroit Steel Prod. Co., Detroit  
E. D. Frederick Co., Holyoke, Mass.  
Genfire Steel Co., Youngstown, O.  
David Lupton's Sons Co., Philadelphia  
Penn Metal Co., Boston  
Sykes Co., Chicago

## WIRE AND CABLE

\*American Steel & Wire Co., Chicago  
\*Williamsport Wire Rope Co., Williamsport, Pa.  
American Cable Co., N. Y.  
Copperweld Steel Co., Glassport, Pa.  
Fischer & Hayes Rope & Steel Co., Chicago  
General Electric Co., Schenectady, N. Y.  
Habitshaw Cable & Wire Corp., N. Y.  
Hazard Wire Rope Co., Wilkesbarre, Pa.  
Mac Whyte Co., Kenosha, Wis.  
Marion Insulated Wire & Rubber Co., Chicago  
National India Rubber Co., Bristol, R. I.  
New York Insulated Wire Co., N. Y.  
Okonite Co., Passaic, N. J.  
John A. Roebbing's Sons Co., Trenton, N. J.  
Safety Cable Co., N. Y.  
Simplex Wire & Cable Co., Boston  
Standard Underground Cable Co., Pittsburgh, Pa.  
Tubular Woven Fabric Co., Pawtucket, R. I.

## WIRE MESH REINFORCEMENT

\*American Steel & Wire Co., Chicago  
\*Truscon Steel Co., Youngstown, O.  
National Steel Fabric Co., Pittsburgh, Pa.  
Wickwire-Spencer Steel Co., N. Y.

## WIRE ROPE FITTINGS

\*L. P. Green, Chicago  
John A. Roebbing's Son Co., Trenton, N. J.

## WIRE ROPE (See Rope, Wire)

## WOOD BLOCKS (See Paving Blocks)

## WOODWORKING MACHINES

\*American Saw Mill Machinery Co., Hackensack, N. J.  
\*C. H. & E. Mfg. Co., Milwaukee, Wis.  
R. L. Carter Co., Phoenix, N. Y.  
Jaeger Portable Power Corp., Detroit  
Jones Superior Machine Co., Chicago  
Master Woodworker Mfg. Co., Detroit

# One for Agile Power One for Brute Strength



(Above) Model LH with one-man power grader. Power aplenty, and speed besides. Traction to master the toughest sod.

(Below) Model DH with Trackson Backfiller. Brute strength that saves time and money on heaviest earth-moving jobs.

*Together They Make  
A Winning Team*

**TRACKSON**  
McCORMICK-DEERING  
**Crawler Tractors**

**Model LH for Pull, Pep  
and Traction Where  
Others Fear to Tread**

**Model DH for Dominat-  
ing Power** • • •

**W**HEN the going is toughest, Tracksons prove their complete mastery of every job . . . make it seem easy, under the most trying conditions.

Forging ahead, gripping tight, responding instantly to every command, these mighty

crawler tractors conquer every obstacle, quickly and economically.

Stalwart and swift, the Model LH combines lighter weight with increased ground-gripping ability—gives you the standard speeds of the McCormick-Deering (agricultural) tractor, and turns in its tracks. Of tremendous power, the Model DH brings outstanding performance to heavy duty jobs, providing reserve protection against emergencies.

Let these Crawlers cut your costs . . . in hauling, scraping, grading, ditching—with road machinery, earth moving equipment . . . the whole year round. Combined with Trackson Shovels, Loaders, Cranes, Bulldozers and Hoists, they speed up the job, increase your earning capacity. Learn how Trackson equipment will show you the way to better work, quicker profits. Send for details of the low first cost and economy of operation. Write . . . **NOW!**

## Trackson Company

**FULL-CRAWLERS & TRACTOR EQUIPMENT**

**519 CLINTON ST.**

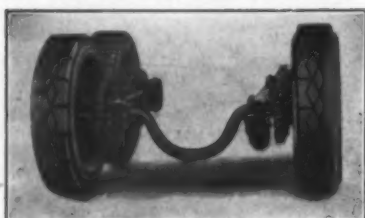
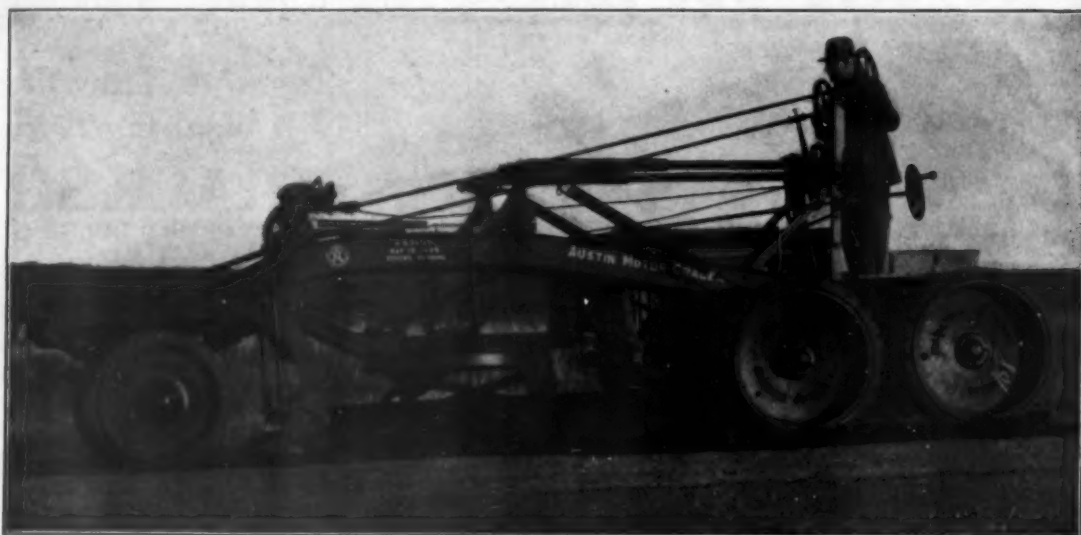
**MILWAUKEE, WIS.**

**FULL-CRAWLERS ★ BULLDOZERS ★ LOADERS ★ SHOVELS ★ CRANES**

When writing advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.

# The AUSTIN

## MORE POWER..MORE TRACTION



*Illustration shows Dual Drive construction*

### *The greatest improvement in motor graders*

The Austin Dual Drive represents the greatest improvement ever made in motor graders. Each rear drive wheel on its differential axle is connected by a roller bearing drive chain to a similar wheel of the same diameter immediately in front of it, converting all four wheels into drive wheels. The two forward drive wheels are mounted on a strong steel axle base at the front of the tractor, and turn freely on their roller bearings. The front end of the tractor is carried on its own drive wheels and axle instead of on the frame of the grader.

Austin Dual Drive Motor Graders are built around McCormick-Deering 10-20 and 15-30 tractors. 50" x 16" tires are used on the 15-30 models. The 10-20 is regularly fitted with 40" x 6", but 40" x 10" are recommended for maximum service requirements.

Other Austin features are—a gearless, screw type blade lift; ball and socket joints; leaning front wheels; cabs and snow removal equipment. Front or rear scarifiers can be furnished when desired. Complete information on request.

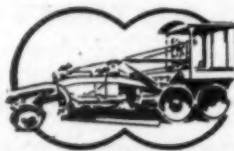


*The pivotal rear connection permits the front end of the tractor to rise and fall without affecting the grader*

## THE AUSTIN-WESTERN LINE

Leaning Wheel Graders—Straight Wheel Graders—Motor Graders—Elevating Graders—Crawler Dump Wagons—3-Wheeled Rollers—Tandem Rollers—Scarifiers—Rock Crushers—Portable Conveyors—Street Sweepers—Motor Sweepers—Sprinklers—Road Oilers—Hot Patch Portable Asphalt Plants—Plows and Scrapers

THE NEW



DUAL DRIVE

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



# DUAL DRIVE

## FOR MOTOR GRADERS . . .

### 4-wheel drive revolutionizes grader performance

The Austin Dual Drive Motor Grader has set new standards of grader performance. More work done per day—more days' service per year—lower road maintenance costs—these phrases and others equally significant are used to describe its increased capacity for work under any and all conditions.

In bad weather when other graders are idle because they are unable to get traction on the soft ground you'll find the Austin Dual Drive turning out its full quota of work—pulling out of wet spots that would mire a two wheel drive machine hopelessly—sticking to the sides of slippery roads that would ordinarily slide a grader into the ditch. And when the "going" is against hard surfaces you'll see the Austin Dual Drive keeping its front up to work that would force other machines to side-slip.

It turns in a brand of performance that can't be touched by other graders because it has the exclusive Austin Dual Drive—drives through four wheels in the rear. The entire weight of

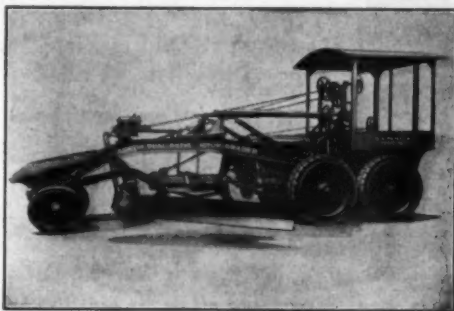
the tractor is carried on these four drive wheels. This weight and the increased ground contact assure traction that will stall the motor before the wheels spin. The Dual Drive uses all of the

reserve power that the motor can deliver. That's why it keeps going when the ground is too wet and rough for other machines. The Austin Dual Drive Motor Grader will stand 50% more side pressure on the grading blade and will stand up to hard work because of the additional bracing strength provided by the four drive wheels. Austin advantages are en-

joyed without increase in the size of the motor or additional maintenance expense.

If you are responsible for grading work and road maintenance costs you cannot afford to be without complete information about the Austin Dual Drive. Your request will bring it.

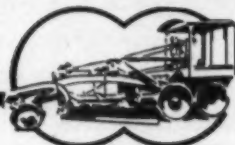
The Austin-Western Road Machinery Co.,  
400 North Michigan Avenue, Chicago, Illinois.  
Branches in principal cities.



## Austin-Western

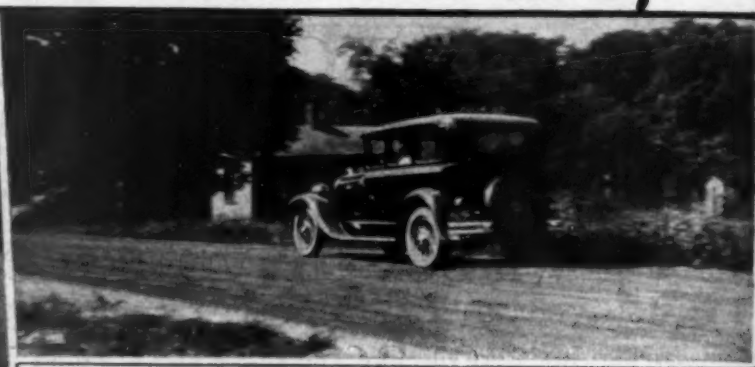
### ROAD MACHINERY

THE NEW



DUAL DRIVE

# DUSTLESS DIRT ROADS!



## DIRT ROADS AND DETOURS NEED NOT BE UNPLEASANT

Dusty roads, particularly detours on main highways, are a source of annoyance and inconvenience to everyone who must travel them, or who lives in their vicinity.

Progressive communities are finding it a matter of pride and satisfaction to conquer the dust nuisance. It is done effectively and cheaply by the application of "3-C" Calcium Chloride.

A sprinkling of "3-C" Calcium Chloride forms a blanket of moist earth over the surface of the road. The dust evil is ended. Trees, grass and shrubbery stay fresh and green. The moist earth packs into a smooth, long-wearing, road surface. Even on heavily traveled roads but two applications a season are necessary.

Write to us today for complete information, and estimated cost of treating your roads and streets.



Minnesota highways made dust-free  
and inviting by application of "3-C"  
Calcium Chloride



**THE COLUMBIA PRODUCTS CO.**  
**BARBERTON OHIO**

"3-C" Calcium Chloride is manufactured by the Columbia Chemical Division, Pittsburgh Plate Glass Company under Patents Nos. 1,592,971 and 1,527,121.

The Columbia Products Co.  
Please send complete information on "3-C" Calcium Chloride for dust prevention.

Name.....  
Street.....  
City.....  
State.....  
CEM  
8-29

# Dependable Power for Every Purpose



## Road Builders

Acme Type A Road Rollers with seven-tooth air pressure Scarifiers, are widely used in breaking hard earth roads. No matter the type of earth on which they are used Acme Road Rollers, equipped with Heavy Duty Continental Industrial Engines, are on the job day in and day out—vital factors in new and old road developments.

CONTINENTAL MOTORS CORPORATION  
INDUSTRIAL EQUIPMENT DIVISION  
Office and Factory : Muskegon, Michigan  
The Largest Exclusive Motor Manufacturer in the World



# Continental Engines



# American Steel & Wire Company

# American Wire Rope



**M**EAASURED in the amount of service received, American Wire Rope is the most economical rope made.

You should get Wire Rope on the basis of service. A rope like American Wire Rope will give you reliable service over a long period of time because it is superior rope.

Consult nearest office. Our engineers will select the right rope for your needs.

## American Steel & Wire Company

*Subsidiary of United States Steel Corporation*

208 S. La Salle Street, Chicago

30 Church Street, New York

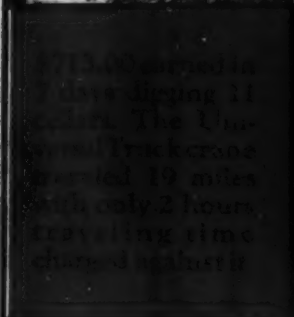
*Other Sales Offices:* Boston Cleveland Worcester Philadelphia Pittsburgh Buffalo Detroit Cincinnati Baltimore  
 Wilkes-Barre St. Louis Kansas City Minneapolis-St. Paul Oklahoma City Birmingham Atlanta Memphis Dallas Denver Salt Lake City  
*A. S. Steel Products Company:* San Francisco, Los Angeles, Portland, Seattle *Export Representatives:* United States Steel Products Co., 30 Church St., New York



\$1375.00 earned on 20 jobs in 25 days. Mobility in getting from place to place made this possible.



"We think nothing of loading the crane for ten miles to unload only one car of material." Universal cranes really average a car an hour.



\$713.00 earned in 7 days digging 11 wells. The Universal Truck Crane traveled 19 miles with only 2 hours traveling time charged against it.

# There is Always a Job to Keep a Universal Truck Crane Busy Earning Money

Names of owners of the Universal Truck Cranes illustrated here, and details of the jobshandled, will be forwarded on request.

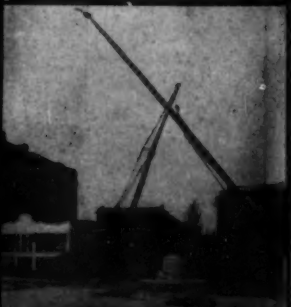
THE UNIVERSAL CRANE CO.  
Lorain, Ohio



Universal Truck Crane, rented \$50.00 a day, moved a point of \$743.05 concrete wing and existing 60 tons of steel. The job was completed in 4 hours.



Delivering 300 ft. of road in one second hour — a 2 hour job. There isn't a live one that can be handled only with a mobile crane.



Averaged 700 feet of 24" to 72" concrete pipe per day. The same crane will do 1001 other profitable jobs for this contractor.

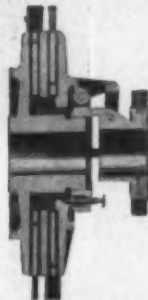


Universal Truck Crane placing flag pole weighing 4 tons, measuring 115 feet long. What other equipment could do this so easily?

# UNIVERSAL



## "Gas, Sewer and Water In"



### PARTS STATIONS

Boston, Mass.—Rapp-Huckins Co. Inc., 59 Haverhill St.  
 Buffalo, N. Y.—Edward W. Rode, 45 A. St.  
 Cleveland—Industrial Engine Parts, Inc., 1053 E. 61st St.  
 Chicago—Motive Parts Co. of America, Inc., 2419 Indiana Ave.  
 Des Moines—Motive Parts Co. of America, Inc., 1294 W. Grand Ave.  
 Detroit—Whitney Brothers, 6464 Epworth Blvd.  
 Fort Worth, Tex.—Fort Worth Wheel & Rim Co., 312 Throckmorton St.  
 Houston, Tex.—Portable Rig Co., Inc.  
 Los Angeles—Coast Machinery Corporation, 406 E. Third St.  
 New York City—John Reiner & Company, Inc., 300 Church St.  
 Philadelphia, Pa.—Massey Machine Works, 632 Race St.  
 Pittsburgh, Pa.—Motive Parts Co. of Pa., 8314 Penn. Ave.  
 Raleigh, N. C.—Motor & Equipment Co., 216 E. Davis St.  
 San Francisco—F. Somers Peterson Co., 57 California St.  
 Tulsa, Okla.—Buda Engine Service Co. of Tulsa, Inc.

AS an advance agent of city growth, the "Little Wonder" Austin ditcher enables outlying subdividers to sell their lots with gas, sewer and water in.

Helping it to do its work quickly, easily and at lower cost, are four Twin Disc clutches. One is at the power takeoff; two more control travel and steering; the fourth is used to handle the excavator bucket line.

In this, and many other material handling machines, the Twin Disc clutch is a factor in securing ease of handling, low cost of operation and unfailing dependability. Our complete line includes all practical sizes and styles. Whatever your clutch needs may be, let us hear from you.

## TWIN DISC CLUTCH COMPANY

RACINE

WISCONSIN



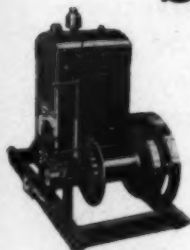
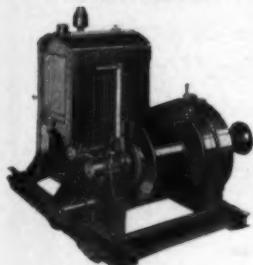
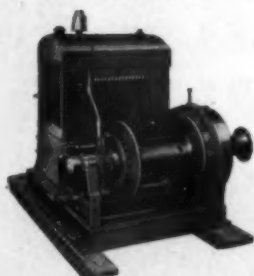
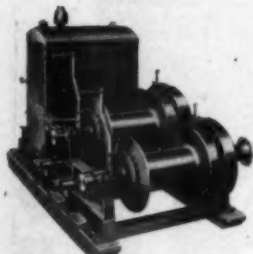
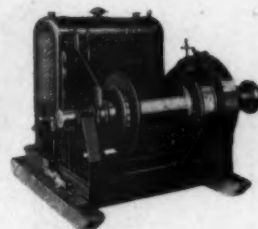
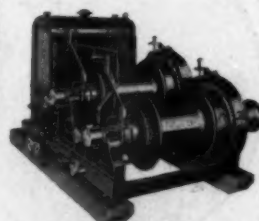
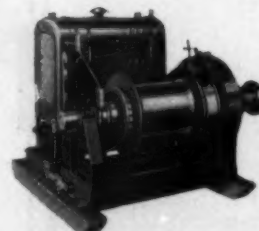
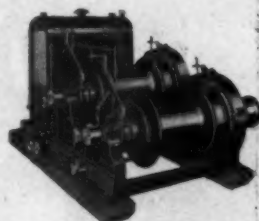
SINGLE & MULTIPLE  
DRUM - REVERSIBLEBROWN  
GIANT-LINENON-REVERSIBLE AND  
CONVEYOR TYPES

## STANDARDIZATION !

## PRODUCES OUTSTANDING VALUES

True value is made possible only through STANDARDIZATION coupled with SPECIALIZATION in the manufacture of a fundamentally sound product.

A quarter century of specialization is embodied in the manufacture of BROWN "GIANT-LINE" HOISTS, with thousands of satisfactory installations throughout every state in the Union, as well as many foreign countries.

MODEL 10-12  
4 TO 6 HP.MODEL 15-20  
8 TO 12 HP.MODEL 20  
15 TO 20 HP.MODEL 20-A  
15 TO 20 HP.MODEL 40  
35 TO 50 HP.MODEL 40-A  
35 TO 50 HP.40-H HIGH SPEED  
35 TO 50 HP.40-D DRAGLINE  
35 TO 50 HP.

**One Design** As a culmination of this vast experience we have developed a STANDARDIZED SERIES of Hoists ranging from 4 to 50 Horsepower—each one a little brother or a big brother of the others—a design that has proved efficient and dependable in every detail of construction.

The Hoist With The  
EXCLUSIVE BRONZE SCREW  
PAT. APP. FOR

**Twelve Models** 4 TO 50 HP.—The STANDARDIZED SERIES consists of twelve Models—eight illustrated here—single and multiple drum combinations—covering every non-reversible hoist requirement within their respective power ranges—gasoline or electric—gear, chain or belt drive.

**\$395 AND UP  
AT THE  
FACTORY**

A comparison of principles of design, details of construction and performance-ability, will, we believe, convince you that our specialization has made available for you **THE GREATEST HOIST VALUES EVER OFFERED.**

Other types and sizes cover many unusual requirements, all carried in stock for immediate shipment.

*Catalog Q upon request*

**THE BROWN CLUTCH COMPANY**  
Sandusky, Ohio, U. S. A.

HOIST SPECIALISTS FOR A QUARTER CENTURY

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

# Those Double Outside Band Friction Clutches

PERHAPS they don't sound so important in an advertisement but *actually on the job*—actually on the job they mean high speed operation and extra capacity every hour of the day!

It's these double outside band, self-equalizing friction clutches with great frictional area that give *FingerTip* ease of control at no loss of the "feel" of the load that is indispensable to fast, confident, accurate operation! *Know the Koehring!*



## Crane Capacities

Quickly convertible to shovel, pull shovel or dragline.

No. 301 — 10 tons at 12' radius, 1 yd. clamshell bucket at 28' radius, 45' boom. Other sizes at proportionate radii and boom lengths.

No. 501 — 17 tons at 12' radius, 1 3/4 yd. clamshell bucket at 35' radius, 45' boom. Other sizes at proportionate radii and boom lengths.

No. 601 — 19 tons at 12' radius, 1 3/2 yd. clamshell bucket at 33' radius, 45' boom. Other sizes at proportionate radii and boom lengths.

**KOEHRING COMPANY**

MILWAUKEE,  
WISCONSIN

PAVERS, MIXERS—GASOLINE SHOVELS, PULL SHOVELS, CRANES AND DRAGLINES

Sales Offices and Service Warehouses in all principal cities

Foreign Department, Room 579, 50 Church Street, New York City

Division of National Equipment Corporation

A 5106-I

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



# force!

## Monarch "50" power brings results

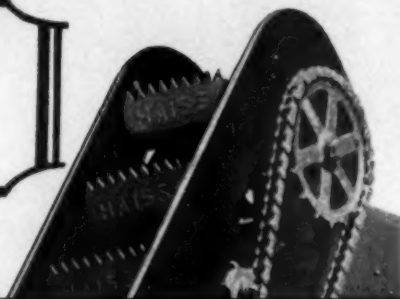
**W**HEREVER track-type tractors are used, Monarch Tractors are proving the correctness of their design and construction. By every test . . . on the most difficult jobs . . . this powerful and efficient tractor is setting new standards of performance. In road-building, industry, and agriculture, increased production and profits follow its use.

You can rely upon the world-famous Allis-Chalmers institution to offer you a product that is thoroughly reliable. The tremendous Allis-Chalmers resources . . . financial, engineering, manufacturing and selling . . . are unreservedly back of every Monarch Tractor. It is the ideal machine for power jobs of every type. Write for detailed specifications of models, and prices.

**ALLIS-CHALMERS MANUFACTURING CO.**  
Specialists in Power Machinery Since 1846  
MONARCH TRACTORS DIVISION      SPRINGFIELD, ILL.

Allis-Chalmers  
**Monarch Tractors**





# You can't mistake it!

**L**OOK at the Loaders you see at work. Look at the digging end. If it has the *simple, positive, revolving-propellers* like the one shown below, watch it dig. You can't mistake the Haiss machine—nor the efficiency of the Haiss patented self-feeding device.

Watch the action of the *continuous, slow-speed crowding motion*. Get closer and look at the gear box, and see how all the clutches and

gears are housed in, dust and grit-free. They run in a bath of oil.

Notice the clean-up scraper, and how well it cleans up. Remember that the sprockets, creeper treads, elevator chain, paddle blades, etc., are of *manganese steel*.

Ask the operator what he thinks of the machine. In a Catalogue (*we'll be glad to send it—No. 527*) or on the job, you can't mistake real value when you see it.

**George Haiss Manufacturing Co., Inc.**

142nd Street and Park Avenue

New York, N. Y.

*Representatives in Principal Cities*



# Thor PAVING BREAKERS

*Powerful  
Vibrationless*

The "recoil" or "kick-back" has been eliminated in the Thor and the full effect of the blow is directed downward on the work. Your men will appreciate the relief from fatiguing vibration and will be able to do more work.

The new steel retainer on the Thor absolutely prevents the steel from dropping out of the nozzle. This retainer, being a flexible chain will not break or loosen if it were to strike the concrete when the steel goes to its full depth.

Here is a breaker that your men will like to use. Put one on a test job. Work it hour after hour, day after day. You'll find that it is built to stand terrific punishment and to make profits for you.

Made in two sizes—one for light, fast work and the other for heavy-duty jobs.



*Thor Portable Air Compressors are the only compressors with the Rix Super-Charger, which enables them to deliver more air than any other compressor of the same capacity. Investigate before you buy. Write for full information.*

**INDEPENDENT PNEUMATIC TOOL CO.**  
PNEUMATIC TOOLS 248 S. Jefferson St. CHICAGO ELECTRIC TOOLS



**DIETZ  
LANTERNS**

## LITTLE WIZARD THE LITTLE LANTERN WITH A BIG LIGHT

**D**IETZ Red Globe Lanterns are universally recognized danger signals for roadside warning—unexcelled for dependability—unequaled for economy.

Among various Dietz Lanterns that are preferred by Contractors, the Cold Blast Little Wizard is especially notable because of its small size and big light.

Little Wizards provide that ounce of prevention which is worth a pound of cure.

**R. E. DIETZ COMPANY**  
NEW YORK

*Largest Makers of Lanterns in the World—founded 1840*

**USE RED  
No Other  
Color Means  
DANGER**

# CLETRAC

## Crawler Tractors



### Cletracs Fully Meet the Modern Needs of Industry

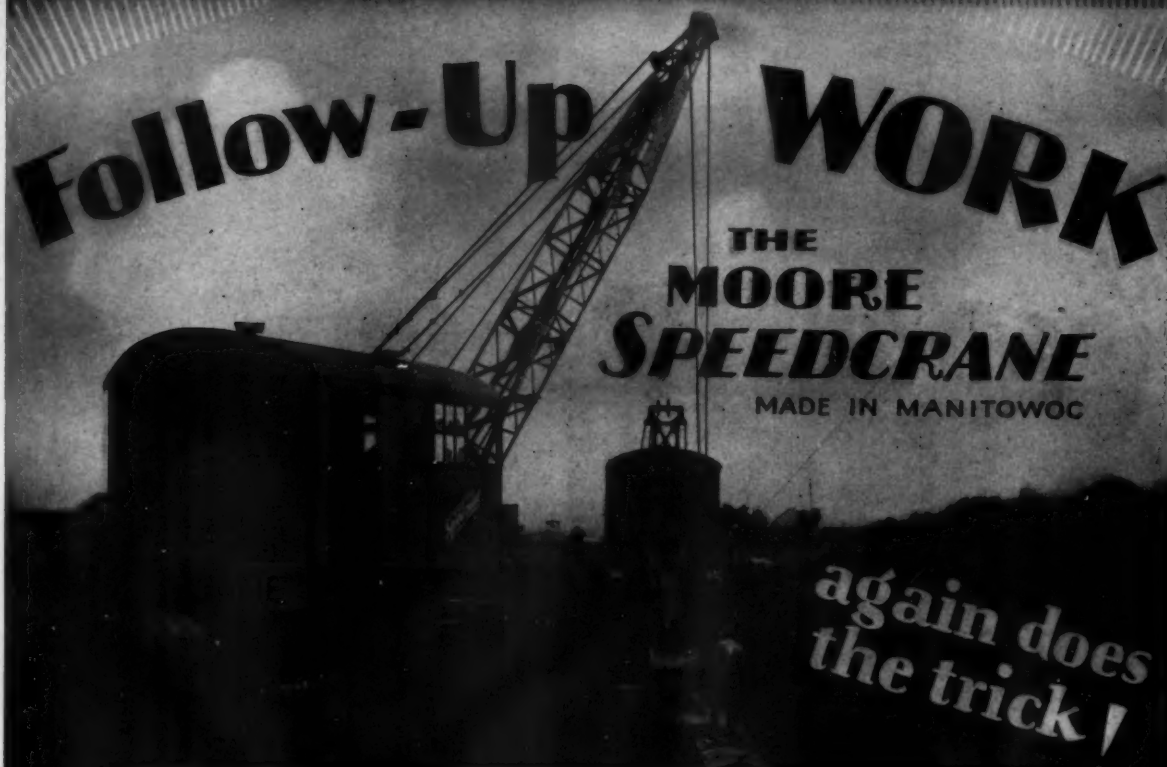
**B**IGGER implements—bigger loads—bigger schedules! All along the line the call today is for greater speed and greater output. More yards moved per hour, more miles covered per day; more work accomplished per dollar spent!

Cletrac Crawler Tractors perfectly meet these modern demands. Their advanced design, exceptional power and remarkable capacity make them the ideal power units for all the jobs of highway and general contracting work.

Built in a complete line of units from 20 h. p. to 100 h. p., Cletracs cover the entire range of power requirements. Write for literature.

**The Cleveland Tractor Co.**  
18321 Euclid Avenue  
CLEVELAND, OHIO





**O**NE large operator in the Middle West has fourteen Moore Speedcranes. Another has eight. A third user writes "Our opinion of the Moore Speedcrane can best be given in an order for a duplicate machine." Repeat orders tell the story—show that the Moore Speedcrane, "Made in Manitowoc", does all that we claim. It's easily converted into Shovel, Trenchhoe and Dragline.

*An inquiry from you does not  
place you under any obligation.*

MANITOWOC ENGINEERING WORKS, Manitowoc, Wis.

*(Sole Licensee to manufacture and sell Moore Speedcranes and Shovels)*

*Chicago Agents: MOORE SPEEDCRANE CO., 2916 W. 26th Street*

*Eastern Sales Agents: FORSYTHE BROS., 30 Church Street, New York, N. Y.*

**SPEEDCRANE**  
MOORE • MANITOWOC  
**SHOVEL ~ CRANE ~ TRENCHOE ~ DRAGLINE**

When writing advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.



## FOR HAULING on time any time at low cost every time—Dodge Trucks

For any hauling job, Dodge Trucks are safe, dependable workers. Grade or full loads, they pull with sureness. Open road or in the get-away, their speed and pick-up insure more miles, more trips, more material hauled.

On the cost sheets—of any owner they now serve—Dodge Trucks show records hard to better . . . In operation and in upkeep, their cost is surprisingly low. Low

first cost and long life add still more to their economy. Test Dodge Trucks with your needs in mind. Compare these rugged, modern workers with any other truck, no matter what its price. Go over the complete line with your Dodge Brothers Dealer. He can deliver the correct chassis, complete with the right body, ready for your service.

You can put a Dodge Truck to work on any hauling job with

full assurance that it will save money on that job. Thousands and thousands of users of Dodge Trucks will tell you so.

### PRICES

<b>MERCHANTS EXPRESS—</b>	
109' wheelbase (4-cyl.) . . .	\$ 545
<b>COMMERCIAL TRUCK—</b>	
120' wheelbase (6-cyl.) . . .	775
1-TON—133' wheelbase (4-cyl.) . . .	745
1-TON—133' wheelbase (6-cyl.) . . .	845
1-TON—140' wheelbase (6-cyl.) . . .	
Heavy Duty . . .	1065
1½-TON—150' wheelbase (6-cyl.) . . .	1345
1½-TON—165' wheelbase (6-cyl.) . . .	1415
2-TON—150' wheelbase (6-cyl.) . . .	1515
2-TON—165' wheelbase (6-cyl.) . . .	1585
3-TON—133' wheelbase (6-cyl.) . . .	1745
3-TON—165' wheelbase (6-cyl.) . . .	1775
3-TON—185' wheelbase (6-cyl.) . . .	1845

*Chassis f. o. b. Detroit*

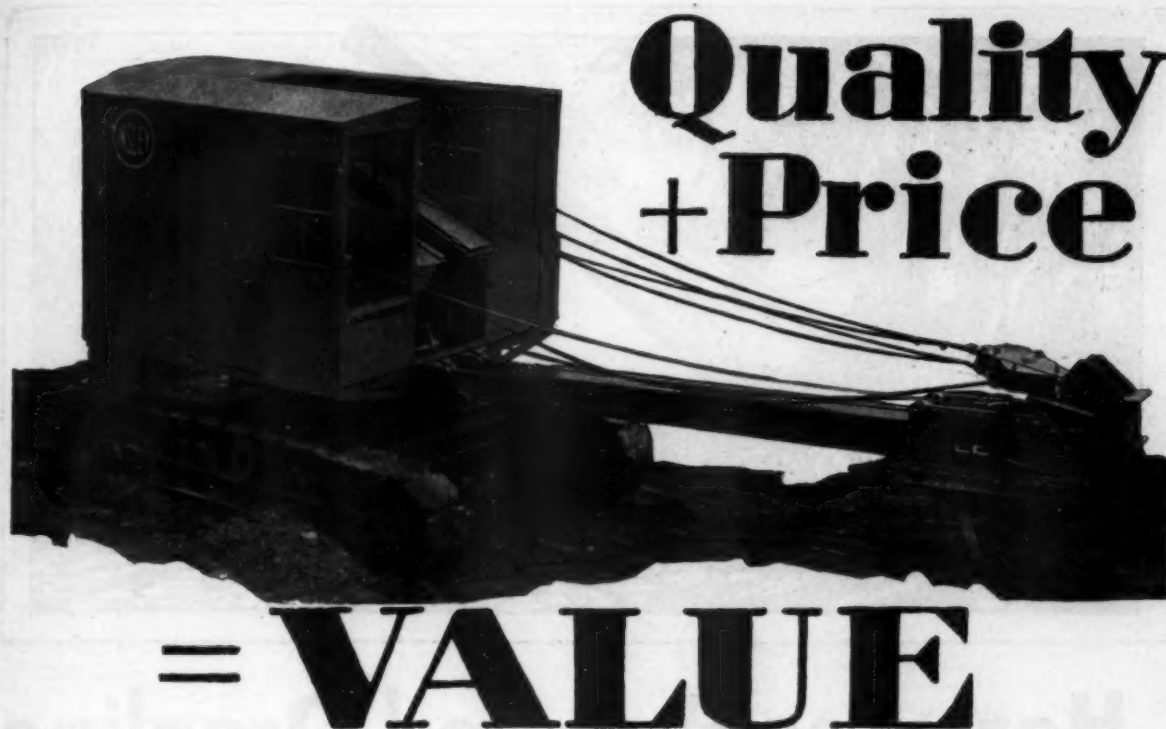
# DODGE BROTHERS TRUCKS



CHRYSLER  
MOTORS  
PRODUCT

**SOLD BY DODGE BROTHERS DEALERS EVERYWHERE**

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.



**I**NSLEY QUALITY is definitely apparent throughout the Half-Yard Insley in its many modern features such as in its roller and ball bearings for the drum shafts—in its heavy and accurately machined castings—its machine cut gears—and the finest precision workmanship. All these and many other features definitely prove its quality.

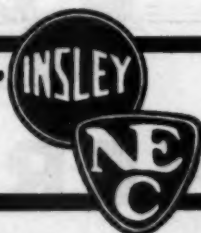
Whereas Insley does not sell price, because low selling price might be taken as an indication of compromised quality, it so happens that there is a Half-Yard Insley, either half circle or full revolving, at a price that is truly out of the ordinary. This coupled with its high quality makes the Half-Yard Insley a value you cannot afford to overlook.

**INSLEY · MANUFACTURING · COMPANY**

INDIANAPOLIS, INDIANA

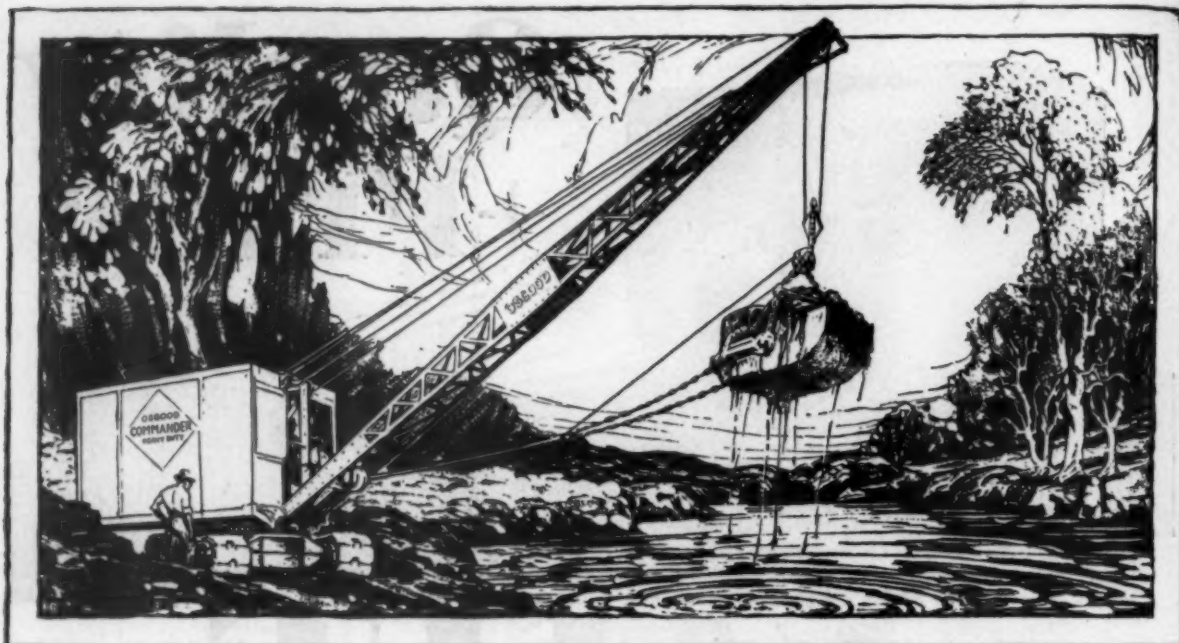
*Division of National Equipment Corporation*

**INSLEY**



When writing to advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.





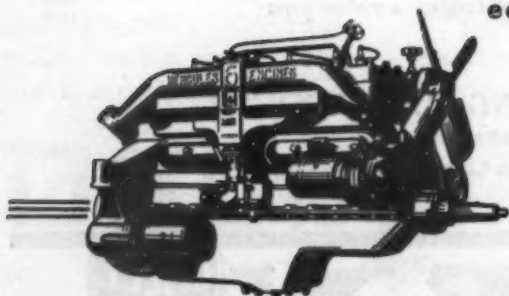
## Hercules Powered Dragline Digs an Artificial Lake . .

AT East St. Louis, Illinois, an Osgood Commander Heavy-Duty Dragline, powered by a Hercules Six-Cylinder Engine, was commissioned to dig an artificial lake in a city park. Day after day, this dragline pulled the bucket through muck and heavy clay—another job accomplished with characteristic Hercules speed and reliability.

Hercules Engines are built expressly for such work. Draglines, cranes and clamshells—large and small capacity shovels—and other types of construction and road maintenance machinery do their best work when equipped with Hercules Heavy-Duty Engines.

**HERCULES MOTORS CORPORATION**  
CANTON, OHIO, U. S. A.

West Coast Branch: Los Angeles, Cal.  
Mid-Continent Branch: Tulsa, Okla.



# HERCULES ENGINES

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.

EDGAR J. BUTTENHEIM  
President

THEODORE R. KENDALL  
Editor

O. E. POTTER  
Associate Editor

P. C. FORD  
Secretary

HERBERT K. SAGE  
Treasurer

MYRON MACLEOD  
Advertising Manager

Vol. XIX

No. 2

# Contractors and Engineers Monthly

August,  
1929

Published Monthly at 443 Fourth Ave., New York, by Bittenheim-Dix Publishing Corporation.

Daily News Plaza, Chicago  
Tom Dix, Vice-President

642 Hanna Building, Cleveland  
George Conover, Manager

155 Montgomery St., San Francisco  
Roger A. Johnstone, Manager

## TABLE OF CONTENTS

<b>BIDS</b>		<b>REINFORCING STEEL AND SUPPORTS</b>	
Bids on Levee Work Increase Slightly.....	81	Rail Forms for Concrete Roads.....	102
<b>BOOK REVIEWS</b>		<b>ROAD MACHINERY</b>	
Cutting Material Handling Costs.....	73	Two New Motor Patrols.....	98
The 1929 Amendments to the New York State Lien Law	77	A Tractor One-Man Grader Combination.....	100
<b>BUILDING CONSTRUCTION</b>		A General Purpose Convertible Roller.....	102
Observations of Construction in Europe.....	76	A Road Grader With Low Center of Gravity.....	104
<b>BRIDGE CONSTRUCTION</b>		<b>TRACTORS</b>	
Construction and Equipment Used on the Lake Cham- plain Bridge .....	51	New Four-Speed Tractors .....	102
<b>CENTRAL MIXING PLANTS</b>		A New Power Take-Off for Tractors.....	106
A Commercial Central Mixing Concrete Plant in Albany, New York .....	70	<b>WHEELBARROWS</b>	
<b>CONCRETE</b>		A New Measuring Tray Wheelbarrow.....	106
Cracking in Rigid Pavements.....	56	<b>EQUIPMENT, ASSEMBLY AND ERECTION OF</b>	
Strength of Concrete Affected by Type of Coarse Ag- gregate .....	69	Dismantling and Assembling Methods Used When Mov- ing Big Shovels in the West.....	80
<b>COSTS</b>		<b>ITEMS OF INTEREST</b>	
Waste, Not High Wages, Makes Building Costly.....	73	Locomotive Crane Accidentally Shoved Into River Re- covered Without Damage .....	61
<b>DOCK AND PIER CONSTRUCTION</b>		The Importance of Subgrades and Pavement Bases.....	73
A New Freight Handling Pier in Baltimore.....	96	Our Front Cover .....	80
<b>DRAINAGE</b>		Next Convention of the American Institute of Steel Con- struction .....	88
Well Point Drainage Used in Clay Territory.....	90	Construction Industry News.....	96
A Drainage Problem on Culvert Construction.....	64	A Selected List of Useful Material.....	108
<b>DREDGING</b>		<b>LAW AND LITIGATION</b>	
Dredging Operations on Large Land Development.....	78	Legal Points for Contractors.....	92
<b>EQUIPMENT AND MATERIALS</b>		<b>RIVER AND FLOOD CONTROL</b>	
<b>ACCESSORIES</b>		A New Bank Grading Machine Developed for Mississippi River Work .....	56
Renewal Valves for Industrial Gasoline Engines....	98	<b>ROAD CONSTRUCTION</b>	
A New Type of Governor.....	102	Central Mixing Plant on 4.41-Mile Canadian Concrete Road .....	54
<b>CONCRETE MACHINERY</b>		Construction Features of Huge Playground Project.....	58
New Proportioning and Mixing Unit for Weighing All Aggregates .....	100	1,700 Feet of 18-Foot Bituminous Macadam a Day.....	62
A New Water Control for Pavers.....	104	Difficult Road Work on the Zion Park-Mount Carmel Highway .....	65
<b>EXPANSION JOINTS</b>		Contractor Makes Novel Straight-Edge and Template... Contractor Operates Own Quarry and Sand Pit on 6.5- Mile Concrete Job .....	82
A New Expansion Joint.....	98	Good Plant Layout on State Road Near Detroit.....	86
<b>HOISTS AND WINCHES</b>		<b>TESTS</b>	
A complete Series of Hoists for Contractors Equip- ment .....	104	A Concrete Pavement for Testing.....	96
A New Hydraulic Hand Hoist for Light Trucks....	106	<b>WELDING</b>	
<b>MISCELLANEOUS</b>		Welding as a Means of Building Construction.....	54
Small Machine Makes Clips and Ceiling Hangers on the Job .....	100		

For Directory of Local Distributors of Contractors' Equipment, See Pages 131 to 155

**F**OR a 1¼ yd. shovel, look for the name LORAIN-75. This is the shovel with the Center Drive—a fast moving powerful shovel, quick on the levers, with nothing but rugged strength from crawler to dipper stick.

It's THERE, every inch of the way. We know it. Thew owners know it, you'll know it too. All you need to do is let it show its stuff—on rock, against time, or over a period of years.

THE THEW SHOVEL COMPANY • Lorain, Ohio  
Shovels • Cranes • Draglines • Backdiggers • Locomotive Cranes  
Gasoline, Diesel, Electric and Steam Power



Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.



Vol. XIX  
No. 2

# Contractors *and* Engineers Monthly

August,  
1929

## Construction and Equipment Used on the Lake Champlain Bridge

*Contract Signed May 8, 1928, To Be Completed August 24, 1929  
Connecting Historic Shores of 139-Mile Lake, for  
Notable Construction Project*



STEEL highway bridge of the continuous span truss type is now practically completed between Crown Point, N. Y., and Chimney Point, Vt., at the narrowest point of Lake Champlain which has been a barrier to highway traffic since pre-Revolutionary days.

On the shores of the lake at Crown Point are the ruins of the historic French and British fortresses now maintained by the state government of New York as reminders of the early history of this section of the country.

### DESIGN OF BRIDGE

The portion of the bridge spanning the lake will consist of one continuous structure having two spans 225 and 270 feet respectively, center to center of adjoining piers, one continuous structure having three spans of 290, 434, and 290 feet respectively, center to center of adjoining piers, and one end supported structure having a single span 270 feet center to center of adjoining piers. The approaches to the lake section of the bridge at each end consist of steel girder viaducts, the girders being supported on steel columns which are hinged at the lower ends to permit longitudinal movement caused by temperature changes.

The roadway construction consists of steel beams and stringers supporting a reinforced concrete floor upon which is built a wearing surface of concrete under the patents of the Sheet Concrete Pavement Co. of America by which the wearing course is separated from the foundation course by a jute fabric netting 1½ inches below the surface. The netting permits a bonding of the two courses but permits the removal of the wearing course whenever it becomes worn out, without damaging the foundation.

The clearance provided under the main span is 90 feet for a width of 186 feet, 78 feet for a width of 300 feet, and 50 feet for a width of 400 feet. In order to obtain these clearances required by the War De-

partment, as the lake is in the class of navigable waters, it was necessary to build the roadway with a 5½ per cent grade on either side of the central portion.

### CONSTRUCTION OF SUBSTRUCTURE

On May 8, 1928, the Lake Champlain Bridge Commission consisting of three members from each of the two states involved, awarded the contract for the substructure to Merritt-Chapman & Scott Corp., New York. The open cofferdam method of construction was decided upon as the contractors' bid for this method was lower than for pneumatic caisson construction. On June 15, 1928, the first pile was driven. Materials and equipment consisting of piles, lighters, tugs, launches, Larssen type steel sheet piling, and other necessities were sent up from New York City via the Hudson River and Lake Champlain Barge Canal to the lake.

The Larssen piling used was 16 inches in width and had a corrugation depth of about 4 inches. The length for the shorter piers varied from 18 to 38 to 52 feet, and for the two deep piers which are nearly 95 feet below the mean water level, the piling was spliced in lengths of 58 and 40 feet and 48 and 50 feet. They drove quite readily with a McKiernan-Terry 7,000-pound hammer through the soft silty clay, which seemed uniform for its entire depth to rock. There was a light covering of sand on top of the silt but the clay extended directly to rock. The piling was handled by a stiff leg derrick lighter crane. The rock was sound, with few seams, smooth and apparently somewhat eroded due to glacial action, and laid in such a way that it was possible to concrete directly on the rock without making any steps or blasting on the bottom. Divers examining the bottom reported everything clean before the concreting started.

The excavated silty material was taken away in scows and dumped in about 12 feet of water away from the channel and about 2 miles from the bridge site. Clam-shell buckets were used on the excavation and filled readily and held the sticky material satisfactorily coming up through the water. The clay stuck to the

piles in a layer about 2 feet thick. To remove this it was necessary to jet it with a stream of water at 150 pounds pressure using a nozzle reduced to  $\frac{3}{4}$ -inch from  $1\frac{1}{4}$ -inch pipe. The jetting made the mud very fluid and in this condition it was pumped out by a 10-inch centrifugal pump.

The 1:2:4 concrete, with 10 per cent excess cement, was deposited with a bottom dump bucket holding about 1 yard of concrete in preference to a tremie because better results can be obtained in this particular class of work where the piers are deep and relatively small and there is small chance to move or lift a tremie on account of cross bracing.

The stone for the concrete came from Mineville, N. Y., from an iron mine about  $\frac{1}{2}$  mile under ground. The fine aggregate was a fine crushed rock secured from the tailings of the iron mine crusher.

#### FLOATING CONCRETING PLANT

The Merritt-Chapman & Scott Corp., used a floating concreting plant on the piers consisting of a barge with Smith mixers, Blaw-Knox bin and batchers to which the aggregates were supplied by lighters bringing the stone and sand from the railroad siding at Port Henry 2 miles away. Ironclad cement from Glens Falls, N. Y., was also delivered by barges through the Lake Champlain canal to the plant and raised to the mixer platform by a stiff leg derrick. The Smith 1-yard mixer delivered the concrete through a short chute to the bottom dump bucket handled by the derrick lighter.

#### STEEL ERECTION AND CONCRETE HANDLING

The contract for the steel erection was awarded to the American Bridge Co., New York. Steel for the approach spans was handled by the usual traveler and then as the work progressed the steel was carried out to the traveler by a steel car on a standard gage track hauled out by a Mundy gasoline hoist. As soon as concreting was begun on the superstructure this was paralleled by a narrow gage track by the subcontractor for that work, Scott Bros. Construction Co., and all concrete was handled from the central mixing plant by a Plymouth locomotive with a well-made hopper mounted on a car frame. A platform car was also used for other materials as required and hay for curing according to New York State specifications.

The reinforcing for the floor system consists of the Rivet-Grip method which is a miniature truss made to the proper size and installed in slots on a metal plate which is run continuously across the bridge, thus making it practically impossible for any mistake to be made in the installation of the reinforcing even by unskilled labor and also making inspection easier. The roadway concrete is 7 inches thick on the approach and 8 inches thick on the bridge.

#### WELDING SAVES EXPENSIVE BRACING FOR SIDEWALK FORMS

Both oxy-acetylene and electric welding were used most effectively by the various contractors on this structure. In fact welding operations practically did away with the usual blacksmith shop and greatly facilitated the work. One notable example was the use of electrically welded diagonal strap iron supports to hold a 3 x 5-inch channel in place. This channel is a

part of the lower curb and is installed to protect the concrete from the wear of truck tire rims. There is another curb above this about 6 inches high, the upper one forming the sidewalk which contains the ducts for the various lighting circuits. What with the ducts and the two curbs the forms for the sidewalks were somewhat complicated and would have required considerable bracing. The contractor welded the diagonal straps to the channel and to the floor beam with a Westinghouse electric welder and then braced the entire set of sidewalk and duct forms to the channel. This saved a large amount of rather dangerous work as the sidewalks are at the outer edge of the structure and there would have had to be considerable scaffolding to permit men to work outside the guard fence line. There were many other instances of saving through the use of welding as the work progressed in cutting and fitting metal and in the quick repair of broken parts of machines. Bars for reinforcing were cut and pipe was quickly heated with the oxy-acetylene flame and then readily bent to the required angle without calling on other trades for an elaborate layout.

#### CENTRAL CONCRETE MIXING PLANT FOR SUPERSTRUCTURE

A large central mixing plant was established by the contractor for the superstructure. With the stone and sand stockpiled during the winter when roads were frozen, the plant was never in need of aggregates. A derrick with a Byers steam hoist and a Lambert hoist on the bull wheel operated a Mead-Morrison  $\frac{3}{4}$ -yard clamshell bucket which kept the wooden bins filled. Cement was run up from a shed at ground level by a skip car. The batch was measured by carefully calibrating the skip of the Jaeger 14-H mixer so that struck measures could be obtained. An admixture of 3 pounds of Celite was made to increase the workability of the mix as much of the labor was from the locality and not accustomed to working concrete into an elaborate network of reinforcement and intricate forms. The results were gratifying. A 1:2:3½ mix was used. The concrete was hauled to the forms by the Plymouth locomotive and the hopper car.

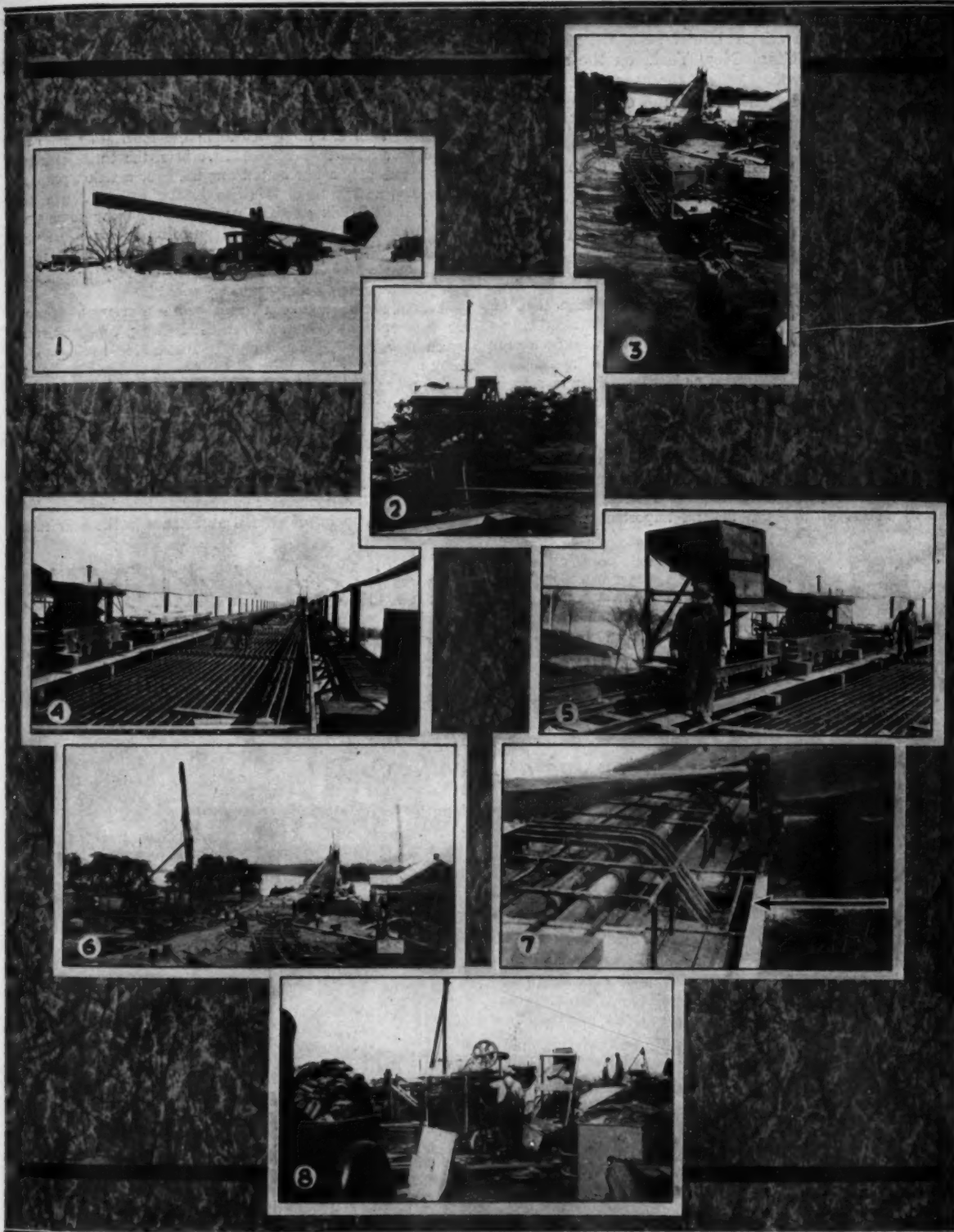
#### INTERESTING DETAILS

In addition to the double curb system the bridge is provided for the entire length with Cyclone guard fence which is high enough to prevent any possibility of anyone accidentally falling from the structure.

Continuous scuppers are provided across the bridge as a means of assisting the light weight snow which is the usual type in this cold territory to blow off the bridge and not accumulate. They are of sufficient size also to permit of easy shoveling through them when wet snow must be removed.

#### PERSONNEL

The Lake Champlain Bridge was built for the Lake Champlain Bridge Commission consisting of three members from New York and three from Vermont, appointed under a compact between the two states. The New York members are Mortimer Y. Ferris, Albert E. Phelps, and Marion L. Thomas. The Vermont members are George Z. Thompson, Charles E. Schoff, and William R. Warner. Fay, Spofford & Thorndike of



#### FEATURES IN THE CONSTRUCTION OF THE LAKE CHAMPLAIN BRIDGE

1. A 14,800-pound steel member for the bridge, the wooden cradle for which weighed 2,000 pounds, all carried on a 5-ton Mack truck with special springs and a governor set to a maximum of 15 miles per hour. 2. The central mixing plant of Scott Bros. Construction Co. 3. A view of the bridge from the central mixing plant, showing the frame for the toll collector's dwelling at the right and in the foreground the concreting hopper and Plymouth locomotive with car loaded with hay for curing. 4. Detail of the Rivet-Grip floor reinforcing. 5. Detail of the hopper car fabricated by the mechanic on the job. 6. General view of the bridge from the central mixing plant showing the steel derrick which handled material from storage to the narrow-gage railroad for hauling to any point on the structure. 7. Detail of the welded plate used to hold the curb channel in place. 8. Ransome 1-bag mixer used on the transformer house adjacent to the toll collector's dwelling



Boston are the engineers with George L. Mirick as Resident Engineer. The contractors were Merritt-Chapman & Scott Corp., New York, on the substructure; American Bridge Co., on the steel erection, and Scott Bros. Construction Co., on the concrete floor of the superstructure and the approach surfacing. The superintendents for the three contractors were Fred Logan, D. Murray Wood and Howard M. Sherwood, respectively.

### Welding As a Means of Building Construction

ONE of the most outstanding developments in the construction industry in recent years has been that of welding as applied to the fabrication of steel buildings. Developed originally for production use, welding equipment found early application in the fabrication of metal parts involving the use of light plates and angles. It was natural that the users of welding equipment should attempt to broaden the field and we find its uses increasing to manufacturing in addition to repair work.

During the last 14 years the structural frames for a number of commercial and industrial buildings, as well as bridges, boats and towers have been fabricated either wholly or in part by means of welding. Several important welding jobs

were done in England and Australia as early as 1918.

In a recent article in the Ferguson Cross Section, R. E. Summers, Vice-President, H. K. Ferguson Co., Cleveland, Ohio, points out that interest in structural welding has been greatly intensified during the last two years by the successful completion of several important welded structures. In some of these, the steel has been welded in the fabricating shop and bolted or riveted in the field. In others, the entire structure was welded, only a few bolts being used for erection purposes.

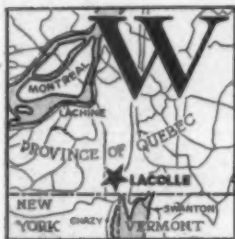
At the present time 38 cities in the United States have revised their building codes to permit welding on some types of structures. Many others will probably follow when more definite specifications have been worked out. In the meantime a number of cities have permitted welding under special permits until their codes could be revised.

Welding has already been established as a means of reinforcing existing structures and for establishing connections between new and old construction. Instead of having to cut away masonry on both sides of the columns to permit bucking up of rivets, only sufficient openings in the outside walls are required to permit the welder to attach the new beams to the old columns. Furthermore there is no noise of riveting guns in connection with the work.

As is the case with most things in the experimental stage, the development and adoption of welding has been slow. Its use seems to be becoming more prevalent and will no doubt advance to the point of general acceptance in the near future.

## Central Mixing Plant on 4.41-Mile Canadian Concrete Road

### *Good Plant Layout and Novel Sprinkling Method Feature Work of Montreal Contractor on Job at Lacolle, Que.*



ITH a minimum of machinery on the road, a maximum of ingenuity shown in plant layout and the use of well-thought-out devices to reduce costs at the central mixing plant, H. Marchessault & Fils, Ltd., Montreal, Que., has built a 2-strip concrete pavement from the United States border to Lacolle, Que., on Quebec Highway 14. The contract included straightening the existing highway and resurfacing with cement concrete. The specifications of the Ministry of Roads called for two slabs with thickened edges on the outside of the slab. The dimensions are 6 inches at the inner edge, and 9 inches at the outer edge with the reduction from the maximum to the minimum dimension taking place in the first 2 feet of the 8-foot slab.

#### GRADING AND FORM SETTING

Grading was a minimum operation on the contract as the ground was practically level and the removal of about 1 inch of the top surface of the old gravel surface was all that was required. This work was done entirely by 2 men with hand picks and shovels following the form setters.

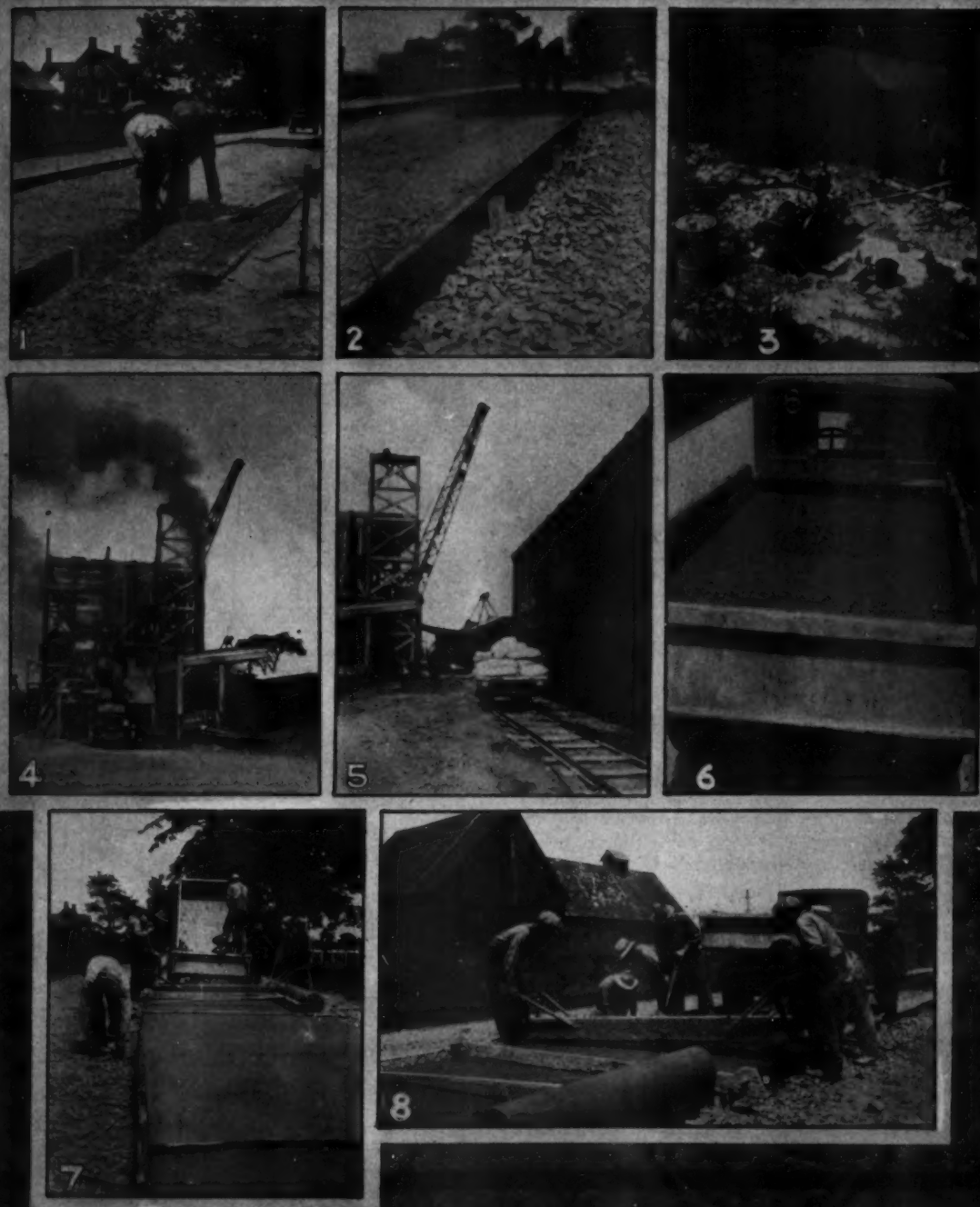
Forms of 2 x 6 and 2 x 9-inch planks were used, the

lengths being close to 15 feet. The planks were staked at the ends and at the centers of each length. The setting was done rapidly by 2 men grading the trench by pick and shovel after which the actual grading was done between the forms. The forms were aligned carefully by eye and straightened as necessary by pushing into line with a crow-bar.

#### CENTRAL CONCRETE MIXING PLANT

Crushed stone was received by railroad from Joliette, Que., about 70 miles distant and sand came in 125 miles also by rail from South Durham, Que. Unloading was handled by a Brownhoist locomotive crane with a Brownhoist 1-yard clamshell bucket. The material was either stockpiled or loaded directly to the high wooden bins above the Ransome 1-yard mixer.

Cement was received by rail from the plant of the Canada Cement Co. At first the unloading of the cement was a problem and it was feared that either demurrage would pile up or a large cement shed would have to be built. This was solved by laying an industrial railway track alongside the spur track and unloading the cement in bags onto a flat car and pushing it to the elevator at the mixer. The 7 bags for the batch were emptied into the elevator and then at a signal from the mixer operator the elevator was raised and automatically dumped into a small metal hopper from which it flowed by gravity to the top of



**METHODS AND EQUIPMENT USED BY H. MARCHESSAULT & FILS, LTD.**

1. Preparing the grade for the forms. 2. The wooden forms securely staked. 3. The Canadian Fairbanks-Morse pump which furnished water to the central mixing plant and to the tank truck for sprinkling the cancas. 4. The central mixing plant showing the locomotive crane unloading the cars and the Ransome mixer ready to deliver a batch. 5. The narrow gauge car which was run along beside the spur track to convey cement to the elevator from the railway cars. 6. A truck-load of concrete waiting on the road to be dumped. 7. Dumping a load of concrete and spading. 8. Using the "big bunk" or hand screed and the roller for removing excess water from the concrete in the foreground.

the stone batch in the calibrated hopper of the Ransome mixer for the sand and stone aggregates. The flow of the sand and stone from the bins was controlled by sliding gates operated by long levers. Water was

accurately controlled with a Ransome tank mounted outside the bins over the mixer.

The Marchessault organization was the first contractor in the Province of Quebec to use a central mixing plant. Water for the concrete as well as for the sprinkling truck for curing the road was pumped from a rather highly colored stream about 500 feet distant from the mixer to a 10,000-gallon wooden storage tank. The water was piped to the mixer and also about 150 feet beyond for the sprinkler truck tap.

The trucks backed up one at a time to the delivery chute of the mixer to receive the batch and then drove directly to the road to deliver the load. A fleet averaging 10 Chevrolet and Dodge trucks with Brantford steel hand-dump bodies was required to handle the batches to the road.

#### CONCRETING OPERATIONS

The trucks backed through the forms which were not maintained more than 75 feet ahead of the concreting and dumped the batch direct on the subgrade as required. Three men were regularly employed shoveling the concrete to fill evenly the space between the forms, and two men were used on the "bunk" or heavy screed made of 4 x 8 red pine timber and having convenient handles on the ends for the laborers. Following this operation two men evened up the surface filling in any depressions brought out by the heavy screed. The same two men operated a small screed or "small bunk" giving a very smooth finish to the surface. These two men also used the 6-inch metal roller filled with concrete to compact the surface as is required by some state specifications. The hand finishing operations and edging were done by the same operators.

#### REINFORCING AND EXPANSION JOINTS

The only reinforcing required was 4-foot bars,  $\frac{1}{4}$ -inch in diameter set every 4 feet so as to bond the two slabs. These were run through holes in the wooden forms.

A  $\frac{1}{4}$ -inch tar and felt expansion joint was set without a bulkhead giving a somewhat wavy joint at times.

#### CURING

As soon as the surface water had left the concrete it was covered with canvas squares with ropes set into the corners to facilitate handling. The following morning fresh earth was shoveled onto the surface of the concrete after removing the canvas and the earth kept sprinkled for 10 days. The earth was removed at the end of 15 days and the road opened for traffic at the end of 21 days.

A tank truck with a power take-off operating a small centrifugal pump was used to sprinkle the earth cover. This was more economical than laying a pipe along the entire length of the road just for sprinkling. The centrifugal not only pumped the water into the truck tank but also pumped it out through a nozzle made of a pipe hammered down to a slot and with a swivel to permit directing it satisfactorily.

#### PERSONNEL

The work was under the direction of the Ministry of Roads, Province of Quebec, with Numa Lamonde

as Inspector. H. A. Marchessault was Superintendent for H. Marchessault & Fils, Ltd.

### Cracking in Rigid Pavements

**T**HE occurrence of cracks in rigid pavement has become so common and familiar that there is a tendency to accept this condition as a necessary one. These cracks, however, whether short surface fissures, complete transverse or extended longitudinally fractures are structural defects.

The ideal toward which rigid pavement design should strive is an uncracked pavement and this can be accomplished by building it in a series of articulated units each sufficiently strong to resist the external forces which tend to crack the slab. The principal causes of cracking, as pointed out in an article on the subject appearing in the *Proceedings* of the Eighth Annual Meeting of the Highway Research Board, are temperature change, moisture change, changes in subgrade, load effects and other factors.

It has been demonstrated that either a change in temperature or a change in moisture content of the concrete will cause a corresponding change in volume. As soon as the concrete has been placed it begins to lose its moisture and as it dries out it contracts. The surface loses moisture more rapidly than the interior of the mass and thus a differential shrinking occurs, causing numerous small fissures to form. This rapid moisture loss from the surface can be prevented by the proper type of curing. As the pavement as a whole loses moisture or is subject to a drop in temperature or both it tends to contract from the free ends of the slab toward the center. The forces caused by contraction accumulate until they exceed the tensile strength of the cross-section and rupture occurs.

Mortars and concrete expand with a rise in temperature and contract with a fall. The coefficient of linear expansion appears to vary with the richness of the mix, the moisture content, temperature range and perhaps other factors. A temperature differential between the upper and lower surface of a slab will cause a warping of the surface. This may be sufficient to actually lift the edges or corners from the subgrade.

There has been little research on the resistance of concrete to pure tension. Such data as are available indicate this property to be influenced by the same factors which affect the compressive strength, and further, that the effect of the type of aggregate is more marked. Tests have shown that the coefficient of friction between the pavement and the subgrade varies with the smoothness, type of subgrade material and its moisture condition. A study of this data will help in the design of units strong enough to resist these external forces and to remain structurally intact when such changes occur.

## New Bank Grading Machine Developed for Mississippi River Work

**I**N order to check the sloughing off of banks and to stop undermining, the banks of the Mississippi River have been graded off to a 4 to 1 slope with a hydraulic grader similar to the hydraulic giants used in grading operations in the West. This work is about as cheap as any operation in the work along the river but it can only extend to the level of the water. In the last two years high water has extended over a much longer period than formerly and has thus hindered the grading operations with the hydraulic machine. To permit grading to be continued during high water a machine has been developed by the Corps of Engineers, U. S. A., with the cooperation of the Bucyrus-Erie Co., that will grade below the water level as well as above.

The basis of the new machine, which it is felt will revolutionize bank grading operations, is the old Bucyrus Class 230 dragline. The machine when first erected was used as a dragline which has been in service since 1917. A new boom 150

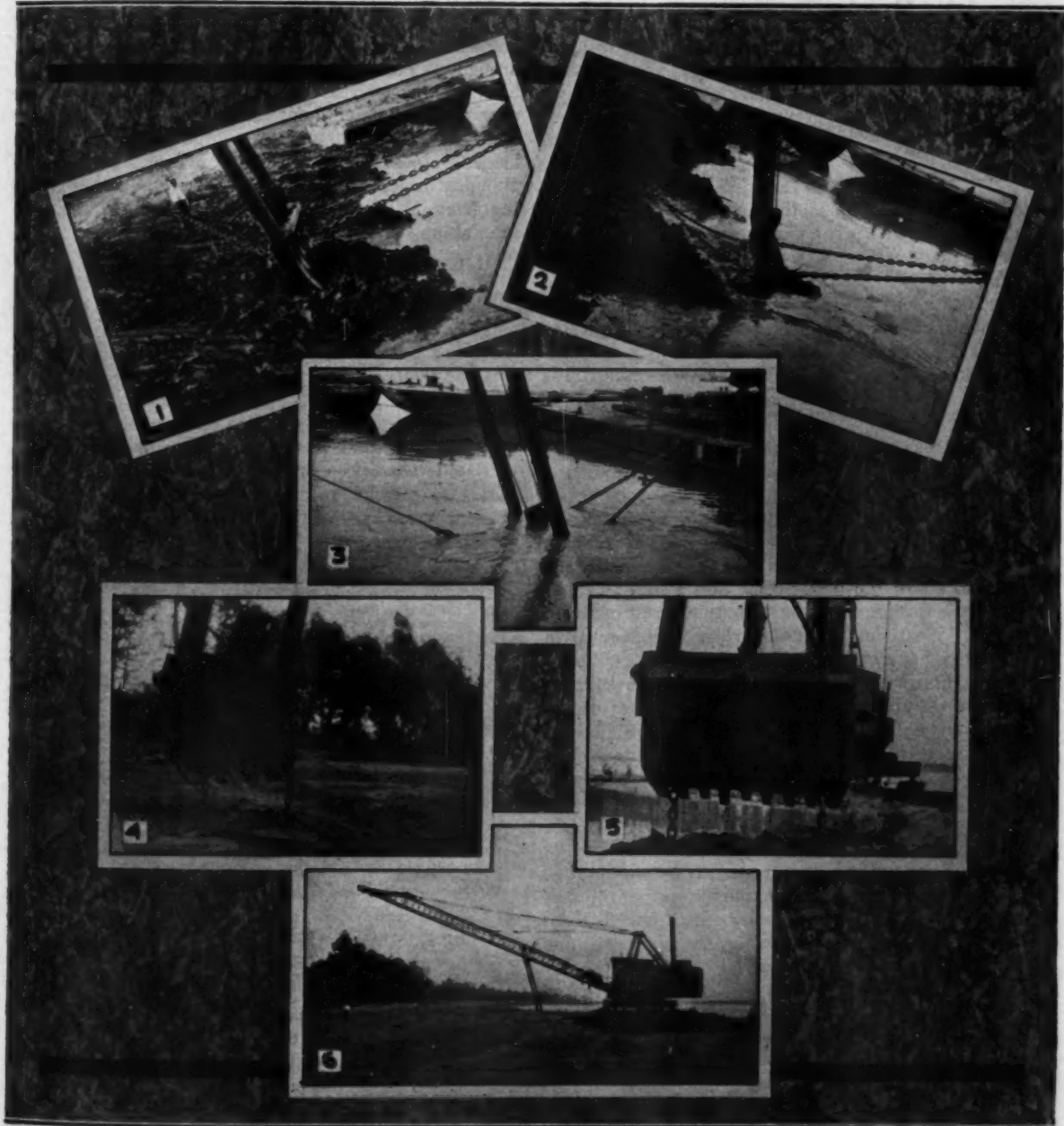


feet in length was built with extra channels on either side to support a carriage which runs up and down the boom with the 6 x 7-foot scraper. The sticks on the scraper as now made are 60 feet long built of channels with the flanges turned in and both riveted to an I-beam.

The scoop or scraper is made of boiler plate 1 inch thick and with teeth about 4 x 6 inches attached to the sheet. Chains attached to the front of the scoop are affixed to a 1 3/8-inch cable which pulls the scoop toward the floating machine as the carriage runs down the boom under the control of two operators. The back of the scoop is reinforced with channels.

In operation, the boom of the machine is set on a slope of 3 1/2 to 1 and the scoop run out to the end of the boom.

Then as the carriage and the scoop are pulled in, the scoop is dropped at a rate which will permit it to grade the bank on a 4 to 1 slope. If the scoop is not controlled by the lowering cables it will dig itself in rapidly as it is slightly curved in section. As soon as the grading operations are completed on such sections as in Yellow Bend below Arkansas City and other places where the erosion is very rapid the revetment will be placed to check the undercutting of the current. The concrete mats are rapidly replacing the willow mats on all revetment work. This season's work in the Vicksburg District will be entirely concrete. The amount of labor required to make and place the concrete mats is much less than on the older willow mats. The cost of concrete is about one-half that of willow and the concrete construction 8 times as fast.



#### VIEWS OF THE NEW BANK GRADING MACHINE

1. A close-up of the scoop just as it is starting to gather material. 2. View showing scoop entering the water. 3. The scoop almost submerged. 4. A view of the front of the scoop. 5. Close-up of the back of the scoop. 6. View of the whole machine from a distance

# Construction Features of Huge Playground Project

*Three Bridges and Bituminous and Concrete Highways  
With 72 Acres of Concrete Parking Fields  
on South Shore of Long Island*



NEW YORK STATE is expending millions of dollars to create breathing spaces for its taxpayers and others owning automobiles who are thus able to reach the remarkable playgrounds and bathing places which are being developed on Long Island and elsewhere in the state. The Long Island State Park Commission is the agency through which expenditures for the great playground at Jones Beach are being made. The New York State Department of Public Works has been commissioned to prepare plans and specifications for the work which it will construct and then turn over to the Park Commission to operate. The Park Commission is financing the work through direct appropriations given it by the State Legislature.

## EXTENT OF WORK AT JONES BEACH

This work has been under way for nearly two years, although some of the contracts were only awarded in April, 1929. The first contract was awarded to R. A. Perry for a hydraulic fill from the Merrick Road southerly to Jones Beach in 1927. In 1928 a contract was awarded to Conner Bros., for paving from the Merrick Road to the first bridge and also 1,500 feet south of this bridge with a 40-foot reinforced concrete pavement. Work on the first bridge structure with approaches was awarded to the W. H. Gahagan Realty Co., Inc., in April, 1928, but the bridge has suffered many delays and was only completed in time for the opening of the first section of the Ocean Boulevard late in July. The second portion of the project comprises the construction of two bridges, 3 and 4, Bridge 3 being a 75-foot double leaf, double opening bascule. This contract also includes the laying of 1.45 miles of penetration method bituminous macadam, 0.97 mile of 1:2:3½ mix concrete pavement, and 0.02 mile of wood block pavement. The third section comprises the first part of the Ocean Boulevard development and includes 3.55 miles of concrete pavement on the boulevard and a short section of the causeway.

## TRANSPORTATION DIFFICULTIES

The factor of transportation has loomed large on these contracts as there is no connection with the mainland for any of the work beyond Bridge 1 until that structure was completed in July. This necessitated the carrying of all men from the mainland by motor boat. Inasmuch as the fall of the tides leaves a very narrow and somewhat uncertain channel there was no end of delay due to the grounding of the various

motor boats.

While at first it looked as though this would also prove a hazard to the contractors it has not caused undue trouble as practically all the materials can be brought in economically by barge on flood tide. Sand for the paving on the boulevard was hauled by truck over the completed approach to the causeway close to Bridge 1 and dumped in a large pit and from this loaded onto a barge by a belt conveyor. Long Island abounds in excellent sand for concrete and thus trucking from local pits is more economical in this case than shipment from more distant pits by water all the way.

## BRIDGE No. 1

The handling of materials on Bridge 1 has been entirely by scows. During the life of this contract there has been a large amount of equipment used on this one relatively small piece of work. This has been largely due to the financial backing of the contractor which has made it possible for the organization to try out various combinations of equipment available. Sand and stone have been brought in by barge and handled by lighter derrick in an improvised batch box to the Jaeger mixer from which it is buggied to the forms for the beams.

No.	Item	Unit	Price	Quant.	Amount
2A	Embankment in place.....	C. Y.	\$0.16	129,000	\$19,200.00
8	Trimming shoulders.....	L. F. Rd.	0.10	1,100	110.00
9	Preparing fine grade.....	S. Y.	0.05	5,000	250.00
11	Timber and lumber.....	M. F. B. M.	80.00	5	400.00
11A	Timber and lumber, creosoted.....	M. F. B. M.	130.00	20	2,600.00
16	Portland cement.....	Bbl.	3.15	2,533	7,985.25
21	Conc. conc. for struct. 1:2:3½ mix.....	C. Y.	23.00	454	10,485.00
21	Sec. Class conc. 1:2½:5 mix.....	C. Y.	15.00	330	4,950.00
28S	Steel fab. reinf. for conc. pavt.....	S. Y. Pst.	0.40	730	292.00
28	Bar reinf. for structures.....	Lb.	0.06	117,900	7,074.00
29	Structural steel.....	Lb.	0.05	12,600	630.00
30B	Found. course, cinders.....	C. Y.	5.00	1,000	5,000.00
45	Bot. course, broken stone.....	C. Y.	8.00	450	3,600.00
47	Top course, bit. mac. pen. meth.....	C. Y.	11.20	450	5,040.00
51	Conc. conc. pavt. 1:2:3½ mix.....	C. Y.	11.00	82	902.00
61	Bit. mat. waterproofing.....	S. F.	0.06	6,840	410.40
66	Bit. mat. A. pen. method.....	Gal.	0.17	15,000	2,550.00
70	Stone filling.....	C. Y.	6.50	3,360	21,840.00
83D	Concrete sheet piles, 1:1½:3 mix.....	C. Y.	54.00	375	20,250.00
84	Timber piles.....	L. F.	0.70	3,990	2,583.00
86A	Precast conc. piles 1:1½:3 mix.....	L. F.	5.30	2,420	12,826.00
88	Loading tests.....	Ea.	250.00	2	500.00
105	Maintaining navigation.....	L. S.	700.00	Nec.	700.00
106	Wooden railing.....	L. F.	7.10	1,000	7,100.00
107	Navigation lights.....	Ea.	45.00	6	270.00
Total.....					\$137,550.65

## BRIDGES 3 AND 4

Preparing the foundations for the piers of Bridge 3 involved the use of cofferdams made up of Larssen steel sheet piling 48 feet long. The top of this sheeting was driven to elevation +4 with a McKiernan-Terry steam hammer. This set of cofferdams blew twice. A total of 240 timber piles 20 feet long was used in each cofferdam with the top of the pile driven to elevation —19. Four sets of 12 x 12 walers were used with 12 x 12 struts.

Bridge 4 as well as Bridge 3, was awarded to C. H. Earle, Inc., and on these bridges the concrete piling was sublet to the Raymond Concrete Pile Co., New York. The Arundel Corp., was awarded the contract by the general contractor for about 1,000,000 cubic yards of hydraulic fill on the entire contract. The material for this fill was secured by dredging stone creek east of the causeway between Bridges 3 and 4. The dredge on this work handled about 300,000 cubic yards of sand a month working 24 hours a day.

#### CONCRETING PLANT AT BRIDGE 4

The C. H. Earle Co., used a simple and effective floating concreting plant on Bridges 3 and 4. It consisted of a barge on which is mounted a cement shed, a Portable Machinery Co., belt conveyor, a Koehring 28-S mixer, a Blaw Knox bin and batcher, and an Insley concreting tower and chutes. Aggregate was brought alongside and unloaded by lighter and cement carried to the mixer as needed from the storage shed by the portable conveyor. A large tank is provided for water for mixing.

JONES BEACH CAUSEWAY, PT. 2, BRIDGES 3 AND 4					
No.	Item	Unit	Price	Quant.	Amount
1	Clearing and grubbing.....	L. S.	\$100.00	Nec.	\$100.00
4	Unclassified excavation.....	C. Y.	1.00	7,700	7,700.00
8	Trimming shoulders.....	L. F. Rd.	0.10	12,000	1,200.00
9	Preparing fine grade.....	S. Y.	0.10	53,445	5,344.50
11	Timber and lumber.....	M. F. B. M.	75.00	32	2,400.00
11A	Timber and lumber, creosoted.....	M. F. B. M.	125.00	41	5,125.00
15	Portland cement.....	Bbl.	2.90	29,560	85,724.00
18	Cem. conc. for structures, 1:2:3½ mix.....	C. Y.	30.15	5,480	110,422.00
20	First class conc., 1:2:4 mix.....	C. Y.	14.90	830	7,997.00
21	Second class conc., 1:2½:5 mix.....	C. Y.	14.00	2,730	38,220.00
25	Metal reinf. for conc. pavt.....	S. Y. Pvt.	0.26	18,405	4,785.30
25B	Steel fab. reinf. for conc. pavt.....	S. Y. Pvt.	0.30	7,180	2,154.00
26	Bar reinf. for conc. pavt.....	Lb.	0.10	2,600	260.00
28	Bar reinf. for structures.....	Lb.	0.054	1,060,000	57,240.00
29	Structural steel.....	Lb.	0.07	1,012,400	70,868.00
37	Metal railing.....	L. F.	6.00	170	1,020.00
47	Top course, bit. mac. pen. meth.....	C. Y.	10.00	2,920	29,200.00
51	Cem. conc. pavt. 1:2:3½ mix.....	S. Y.	12.00	4,880	58,560.00
57A	Wood block pavement.....	S. Y.	4.00	570	2,280.00
61	Bit. mat. waterproofing.....	S. F.	0.05	67,000	3,350.00
66	Bit. mat. A. pen. method.....	Gal.	0.16	101,200	16,192.00
79	Stone filling.....	C. Y.	6.00	5,500	33,000.00
82	Coffer dams, pump, bail, drain, Br. No. 3.....	L. S.	30,000.00	Nec.	30,000.00
83D	Cose. sheet piles 1:1½:3 mix.....	C. Y.	66.00	405	26,730.00
84	Timber piles.....	L. F.	0.90	13,980	12,582.00
86A	24" pre-cast concrete piles, 1:1½:3 mix.....	L. F.	8.50	16,500	140,250.00
86B	18" pre-cast conc. piles, 1:1½:3 mix.....	L. F.	6.00	2,440	14,640.00
86A	Loading tests—conc. sheet piles.....	Each	200.00	4	800.00
86B	Loading tests—timber piles.....	Each	200.00	4	800.00
86C	Loading tests—24" pre-cast conc.....	Ea.	400.00	12	4,800.00
86D	Loading tests—18" pre-cast conc.....	Ea.	300.00	4	1,200.00
105A	Sawed lumber, not creosoted.....	M. F. B. M.	100.00	3½	350.00
105B	Sawed lumber, creosoted.....	M. F. B. M.	150.00	57	8,550.00
106	Machinery.....	Lb.	0.28	150,000	42,000.00
107	Elec. equipment for bascule bridge operation.....	L. S.	30,000.00	Nec.	30,000.00
108	Maintenance accessories.....	L. S.	300.00	Nec.	300.00
108A	Maintaining navigation, Br. No. 3.....	L. S.	1,000.00	Nec.	1,000.00
109B	Maintaining navigation, Br. No. 4.....	L. S.	500.00	Nec.	500.00
110	Wooden railing.....	L. F.	7.50	2,190	16,425.00
111	Stone masonry facing.....	C. Y.	60.00	160	9,600.00
112	Towers.....	L. S.	20,000.00	Nec.	20,000.00
121	Embankment in place.....	C. Y.	0.15	1,150,000	172,500.00
122	Found. course, cinders.....	C. Y.	7.00	4,870	34,090.00
123	Wooden guide railing.....	L. F.	4.00	1,600	6,400.00
Total.....					\$1,116,538.80

#### OCEAN BOULEVARD AND PARKING AREAS

The Belmar Contracting Co., Troy, N. Y., is the general contractor for the boulevard and plazas and parking areas. A subcontract for the paving on the boulevard was given to Johnson, Drake & Piper.

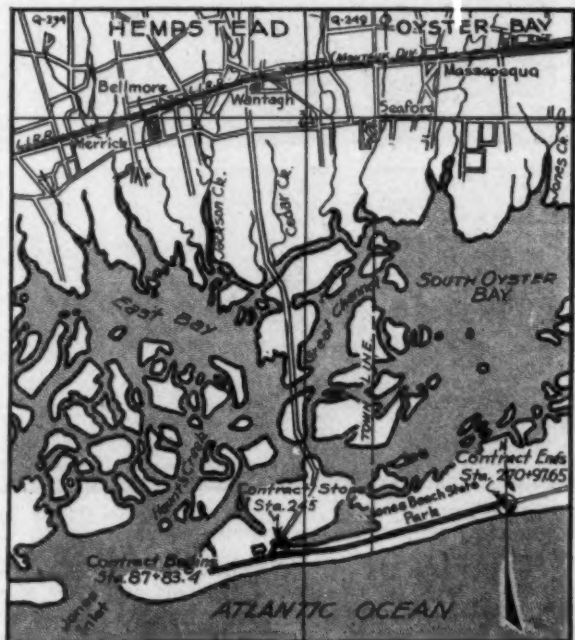
Both organizations are using the same dock for unloading aggregates and cement, there being sufficient dockage for two complete unloading and batching plants. Johnson, Drake & Piper are using industrial railway haulage and Belmar is using trucks. It is necessary to use wood roadways to prevent the trucks miring in the light beach sand but the trucks bounce

so on the planks that the planks have to be loaded down with sand to hold them in place. Belmar used a Northwest crane with Lakewood bucket to unload sand to the stockpile or to the wooden bins equipped with Johnson batchers. Duplicate equipment was used for stone unloading. The trucks ran under the batchers for their proportioned batches.

Johnson, Drake & Piper used a Link-Belt crane on sand and a Koehring crane on stone for unloading and handling to stockpile and bins. Wooden bins and Johnson batchers were also used here. Acme cement was used because it is slightly darker than the usual run of cements as the light on the boulevard will be very strong. This very fact coupled with the lack of an abundance of water for curing according to the usual New York State specifications led to the use of the Hunt Process of curing the concrete by spraying the slab as soon after finishing as possible with a prepared compound of Bermudez and Trinidad asphalt and Gilsonite. Johnson, Drake & Piper used Plymouth gasoline locomotives to haul Koppel cars with Lakewood batch boxes. The method of loading is interesting as it saved much time. The batchers were arranged in pairs of two stone batchers and two sand batchers at just the correct intervals to permit loading the sand into two batch boxes and at the same time stone into two boxes on the car ahead. Whitcomb locomotives were also used by this contractor on some of the trains. A crew for the batchers and train consisted of 2 men on the batchers, one locomotive engineer and one trainman.

#### OCEAN BLVD., PT. 1, JONES BEACH BLVD. WITH PLAZA AND PARKING FIELDS AND THE JONES BEACH CAUSEWAY, PART 3

No.	Item	Unit	Price	Quant.	Amount
4	Unclassified excavation.....	C. Y.	.60	91,500	\$45,750.00
6	Sewer pipe, 12" diameter.....	L. F.	1.25	1,490	1,862.50
7	Pipe underdrain, 12" diameter.....	L. F.	1.25	900	1,125.00
9	Trimming shoulders.....	L. F. Rd.	.10	29,200	2,920.00
13	Preparing fine grade.....	S. Y.	.10	377,000	37,700.00
14	Cast iron pipe, 12" diam.....	L. F.	3.25	372	1,209.00
14	Reinf. conc. pipe 12" diam.....	L. F.	1.80	1,500	2,700.00
15	Portland cement.....	Bbl.	2.90	103,530	300,237.00
15B	Special portland cement.....	Bbl.	4.45	400	1,780.00



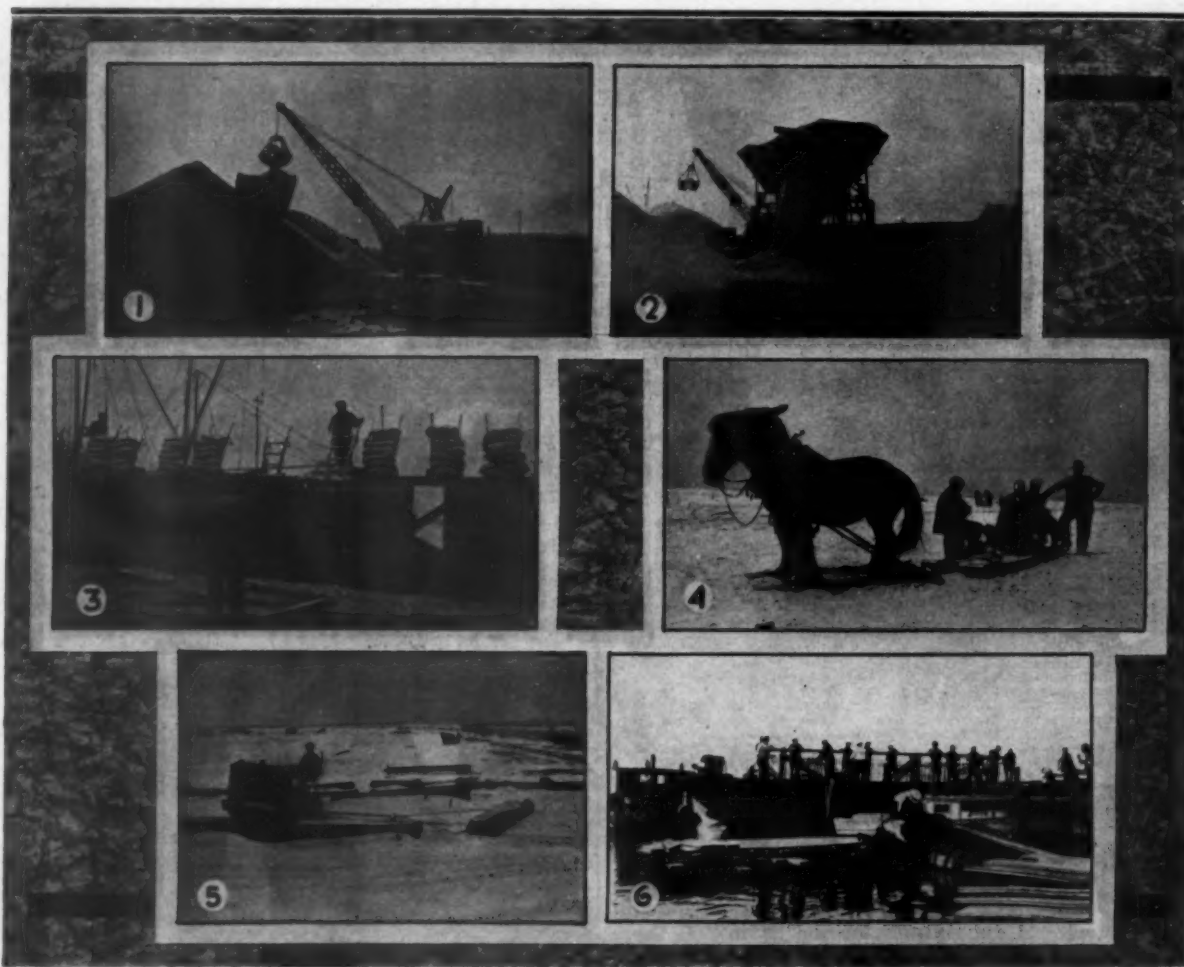
Map Showing the Location of the Jones Beach Job



16	Con. conc. for struct. 1:2:3½ mix	C. Y.	20.00	1,165	23,300.00
20	First class conc. 1:2:4 mix	C. Y.	20.00	110	2,200.00
21	Second class conc. 1:2½:5 mix	C. Y.	16.00	725	11,600.00
25	Metal reinf. for conc. pavt.	S. Y. Pvt.	.30	137,480	38,244.00
25A	Metal reinf. for reflecting pool	S. Y.	.30	3,190	948.00
25B	Metal reinf. for conc. pavt. (Item 25A)	S. Y. Pvt.	.25	247,500	61,875.00
25C	Steel fabric reinf. for conc. pavt.	S. Y. Pvt.	.35	300	105.00
26	Bar reinf. for conc. pavt.	Lb.	.10	18,000	1,800.00
28	Bar reinf. for structures	Lb.	.065	77,000	5,005.00
30	Misc. iron and steel	Lb.	.10	14,000	1,400.00
31	Conc. conc. pavt. 1:2:3½ mix	C. Y.	9.00	28,380	255,420.00
31A	Conc. conc. pavt. 1:2½:4½ mix	C. Y.	8.25	35,000	288,750.00
60A	Treatment with bit. mat.	Gal.	.17	33,000	5,490.00
61	Bit. mat. waterproofing	S. F.	.10	4,000	400.00
64B	Broken stone, L. M. No. 31 size	C. Y.	4.95	1,000	4,950.00
64CD	Broken stone, L. M. No. 3 and No. 5 size	C. Y.	4.80	180	810.00
97B	Conc. curbing, Type "S"	L. F.	.85	7,100	6,035.00
98	Concrete gutter	S. Y.	1.75	370	647.50
104	Concrete R. O. W. markers	Each	3.00	10	30.00
105	Brick sidewalk	S. Y.	2.45	2,220	5,463.50
106A	Wooden guide rail, 2" high	L. F.	1.85	8,000	14,800.00
106B	Wooden guide rail, 2½" high	L. F.	2.00	2,240	4,480.00
106C	Wooden guide rail, 4" high	L. F.	7.50	360	2,700.00
107	Cinders, loose measure	C. Y.	3.45	1,000	3,450.00
108	Top soil	C. Y.	3.40	14,000	47,600.00
109	Waterproofing paint	L. S.	700.00	Nec.	700.00
110A	Wrought iron pipe, 1½" diam.	L. F.	.50	60	30.00
110B	Wrought iron pipe, 2" diam.	L. F.	.75	24	18.00
110C	Wrought iron pipe, 3" diam.	L. F.	1.20	550	660.00
110D	Wrought iron pipe, 4" diam.	L. F.	1.40	735	1,029.00
111	Cement conc. sidewalk	S. F.	.40	4,720	1,888.00
112	Mosaic inserts	L. S.	1,500.00	Nec.	1,500.00
113	Beach grass	Acres	175.00	300	52,500.00
115	Check valve	Each	250.00	2	500.00
Total					\$1,344,723.40

## PAVING OPERATIONS ON THE PARKING FIELDS

The present contracts call for the paving of one 17-acre parking field and one 30-acre field. There will ultimately be about 70 acres of concrete paved parking fields in this development. The paving on the fields is 5 inches thick of 1:2½:4½ mix with the reinforcing placed 2 inches below the top. The 10-foot strips of concrete for the parking fields are poured alternately thus making it possible for one mixer to pour two strips at one time and then leave one strip open and pour the next two alternate strips. When the first strips have cured then the paver can operate on one of the strips and pour the two unpaved strips. Belmar used a Foote paver on each of the parking field paving operations. The concreting crew, which was in duplicate except for the mixer operator and the man dumping the trucks at the skip, consisted of 2 men on each side setting forms with one pin man for the four lines of forms. Two men and one drag board kept the subgrade at proper elevation after the sand



SCENES ON THE DESERT WASTE OF BEACH SAND AT JONES BEACH AS IT IS BEING CONVERTED INTO A RECREATION AREA

1. Northwest crane of Belmar Contracting Co., unloading sand at Jones Beach dock.
2. Train of industrial railway cars hauled by Plymouth locomotive receiving load at batcher plant of Johnson, Drake & Piper.
3. Method of loading bags of cement from cement house platform onto batch boxes on industrial railway track.
4. Stone sled used by Charles J. Marchese of Belmar Contracting Co. (seated at right) for transportation after accident.
5. Cletrac handling cast iron pipe on sand.
6. Making up reinforcing for concrete girders on Bridge 4.

had been sprinkled to keep it in place and to fulfill the requirements of the specifications. One man oiled the forms and one man took care of the joints. Six men worked behind the paver shoveling, 2 spading, and 2 men in front of the Lakewood paver. There were 2 hand finishers. There was no need for the usual number of men to spread burlap, hay and to sprinkle as the Hunt Process for curing does away with all this annoyance for the contractor and inspector.

#### WATER SUPPLY

As this job is entirely surrounded by salt water the question of water supply for mixer water and for the gasoline operated equipment was a serious one. Patrick H. Murray, superintendent for Belmar saw the need of a storage tank of sufficient capacity to tide over any possible breakdowns. A well 230 feet deep was driven to the vast underground reservoir which supplies practically all of this great island with water from Connecticut which flows deep in the rock underlying the waters of Long Island Sound. A Layne & Bowler 250-gallon pump discharges into a 100,000-gallon Acme wooden tank from which Belmar pumps to its pavers and construction camp with two late model Barnes pumps and Johnson uses two C. H. & E. pumps. Both contractors use  $2\frac{1}{2}$  and 2-inch pipe. Belmar keeps about 100 pounds pressure on the line at all times to insure water in the camp  $1\frac{1}{4}$  miles away. There are 150 men in the Belmar camp and about 50 others on the payroll who travel back and forth to the mainland.

A fleet of twelve 2-batch, 3-ton Mack trucks serves the MultiFoote pavers on Belmar's contract. There are over  $2\frac{1}{2}$  miles of special 5-inch Heltzel forms in use on the parking field paving which will be a total loss to the contractor at the end of this job as there is little call for 5-inch forms. On the grading operations for the parking fields Belmar is using about 10 teams with Western scrapers and two Caterpillar Thirties with rotary scrapers to handle the sand.

An unfortunate accident to Charles J. Marchese, one of the partners of the Belmar Contracting Co., when assisting a man at the turntable deprived him of the use of his left foot for a considerable time. Not to be daunted, Mr. Marchese had a stone drag converted into a sled which carried him comfortably about the work in an arm chair.

#### WORK ON BATH HOUSES

Under the Park Commission the R. W. S. Corp. of Huntington, N. Y., is laying the foundation for one of the three bath houses that are to accommodate 10,000 people each when completed. It is interesting to see a MultiFoote 27-E paver working with a short section of industrial railway serving it and the boom delivering concrete to short slabs or to wheelbarrows for wheeling 10 to 20 feet to dump.

#### SAND PARTICULARLY PESTIFEROUS

This section of Long Island is made up entirely of a fine beach sand that is easily blown in the wind. It is reported that the site of this project was so similar to the great Sahara desert that a film company used it for the desert scenes of a famous motion picture. The contractors have not been able to make any capital

out of the beach sand and each has lamented that it was necessary to import all sand for concrete when so much clean sand was at hand. Another and more potent cause for alarm has been the constant shifting of the sand in the wind. When paving was first started a strip of concrete was laid in the afternoon and when the workmen returned in the morning the strip had disappeared entirely. The sand had blown in during the night and covered it. Several of the excavation operations had to be completely protected with snow fence to keep out the sand. One shed was purposely built up three feet above the sand to permit sand to blow past it and thus prevent its untimely interment. The contractor took these pains for naught as the building sill now rests fully 2 feet down in the encroaching sand.

#### PERSONNEL

This extensive project is being constructed under the direction of the New York State Department of Public Works, J. J. Darcy, Resident Engineer; E. T. Gawkins, Supervising Engineer; A. D. Greenman, Assistant Engineer, and Joseph Gurin, Bridge Engineer. A. E. Howland is Chief Engineer for the Long Island State Park Commission.

### Locomotive Crane Accidentally Shoved Into River Recovered Without Damage

**W**HILE constructing an ore handling dock for the Youngstown Sheet & Tube Co., on the Calumet River at Indiana Harbor, Ind., the Fitzsimmons & Connel Dredge & Dock Co., of Chicago, were using a Link-Belt 25-ton steam operated locomotive crane. The crane was standing on a track on the pier extending out into the river, with a full load of lumber piled ahead of it. During the night, the railroad company, evidently not realizing that the crane was standing there, switched a train of 30 cars onto the track and butted against the end of the crane, pushing both lumber and crane into the river.

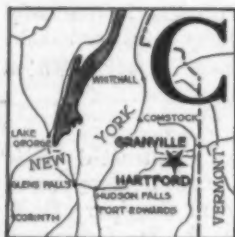
The job of getting the crane back on land again was a considerable one. The boom was removed first and then a Link-Belt service man dove down and attached slings on to the machine. The crane weighs about 75 tons but it was impossible for the 100-ton wrecker to get close enough to make the lift alone and the assistance of a dredge was necessary. The lift was made safely, however, and the only repairs necessary to the crane were several bar steps and hand irons, a section of steam-brake pipe lining and one swivel pin.



*Method of Dipping Side Rods Used on Indiana Concrete Pavements. The Paint Is Bought from a Wholesale Paint Dealer and Is the Waste or Left Over Paints from Many Batches. The Resulting Hue May Be Anything from Brilliant Red to a Dull Drab. After the Rods Are Dipped in the Small Trough They Are Laid Aside to Dry and Then Oiled Before*

# 1,700 Feet of 18-Foot Bituminous Macadam a Day

*A 7.83-Mile Job Between Hartford and Granville, N. Y.  
Being Pushed by Energetic Superintendent  
for Early Completion*



CAREFUL planning in the construction of this job will make it possible for the contractor to collect his bid price ahead of schedule. Furthermore, his planning will keep his own loaded trucks off the finished pavement, thus permitting it to have the maximum time to set before being subjected to

very heavy traffic. Speed is effected by working from 6 A. M. to 7 P. M. on seven days a week without quitting on holidays.

The contract No. 1783 was awarded May 29, 1928, and clearing and grubbing began at once. The first shovel started work on July 10, 1928, and since that time about 20,000 cubic yards of unclassified excavation has been moved each month. About 80 per cent of the road is on new location. The crushing plant was started working at a ledge of good rock near the west end of the job on January 10, 1929, and from that time on it has crushed stone each day. By the end of the winter there was a stock pile of 7,000 yards of  $1\frac{1}{2}$  to  $3\frac{3}{4}$ -inch stone. Spreading of the bottom stone started April 15 and the top stone was first spread on Mothers' Day, Sunday, May 12.

## CRUSHING PLANT

The stone crushing and screening plant was located one quarter of the distance in from the west end of the job and construction began first at the extreme east end and worked as far as the crusher and then work was begun on the stone spreading at the west end and continued until the job was complete. The worst section of cut was at the quarry where in addition to the ledge which was used for the crushing operations there was a large amount of mixed stone and earth excavation.

The crusher, an Acme machine operated by a Climax engine, is fed by 2 Mack trucks working from the quarry face to a pit above the crusher and also by two Insley industrial side-dump cars running from the face to the side of the pit being hauled up the slope by a cable. The crushed stone is raised to the screens by a bucket elevator and then screened to size and stored in wooden bins. Inasmuch as the crusher has not been furnishing enough stone working 13 hours a day it was put on 24-hour operation on June 19.

The face and top of the quarry was drilled with Sullivan and Ingersoll-Rand jackhammers on the face and Sullivan tripod steam hammers on top. Two Sullivan portable air compressors mounted at the top of the quarry furnished air for the jackhammers.

The Belmar Contracting Co., Troy, N. Y., who are handling this job, are employing about 127 men with 38 at the crusher on the day shift and 22 at night.

## EXCAVATION

Two power shovels, each of  $1\frac{1}{4}$ -yard capacity, one a Thew and the other a Northwest, were used to move the 150,000 yards of unclassified excavation which was loaded into 3 Mack trucks and one Linn truck and used for fill. About 60 per cent of the fill on the job was borrow.

Twice during the winter and spring the shovels were mired in bad swampy areas losing much time and requiring much ingenuity to get them out without undue damage. On December 20, 1928, the Thew settled in the swamp until a man could easily step from the roof of the shovel to the ground surface. It took only 7 hours for the shovel to settle but it was a four-day job to get it out again, finally using 3 Linn trucks and the Northwest shovel. During the pulling a  $1\frac{1}{2}$ -inch steel cable broke like so much string. At another time the Northwest began to sink in the mud and settled until the sill of the door on the operator's platform was level with the ground.

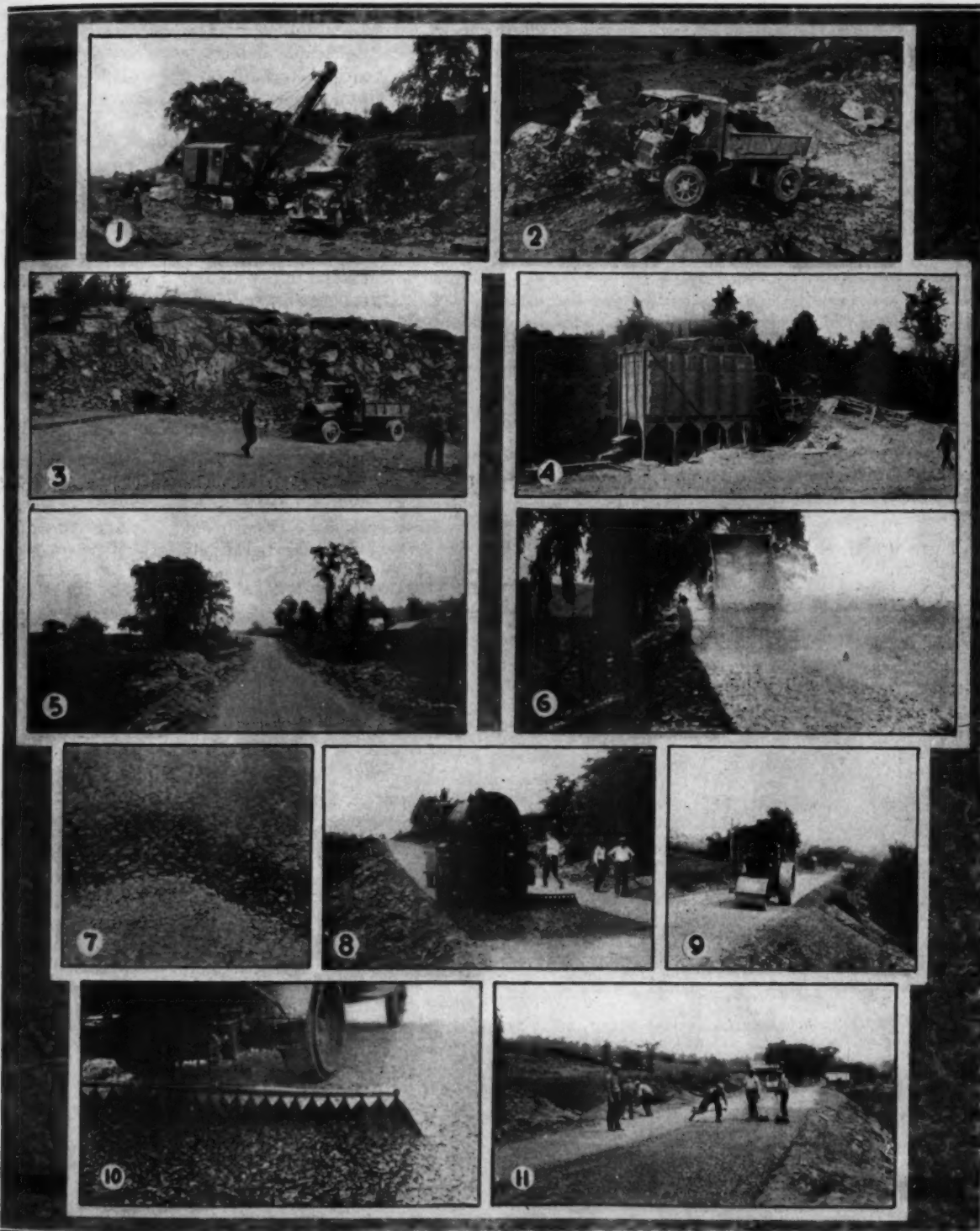
## PAVING OPERATIONS

The pavement consists of a base course, a bottom course, a top course and a seal coat. The base course of 9 inches thickness when compacted is laid with  $9 \times 9 \times 12$ -inch maximum field stone most of which was hauled by the Linn trucks. The bottom course is made up entirely of No. 4 stone from  $2\frac{3}{4}$  inches to  $3\frac{3}{4}$  inches or half and half the No. 4 stone and No. 3 stone from  $1\frac{1}{2}$  to  $2\frac{3}{4}$  inches diameter. The bottom course is filled with crusher screenings and dust rolled with a 10-ton roller to compact it thoroughly. The top course is of No. 3 stone rolled to a thickness of 3 inches.

This course is penetrated with bituminous material A under a pressure of 50 pounds per square inch and at the rate of 2 gallons per square yard. This course is then immediately filled with No. 1 stone of  $\frac{3}{8}$  to  $\frac{1}{2}$  inch diameter and rolled with the 10-ton roller. The pavement is sealed the same day with  $\frac{1}{4}$ -gallon of the bituminous material A, filled with the No. 1 stone and rolled. A wearing carpet of  $\frac{1}{4}$ -inch stone about  $\frac{1}{2}$ -inch thick is left on the road and after about 10 days of traffic it is brushed back on the roadway.

An Acme and an Austin roller were used on this job for all the rolling. Socony asphalt was trucked in about 6 miles on the average haul for the penetration. About 6,000 to 8,000 gallons of the asphalt were used per day when penetration began. The





PROCESS PHOTOGRAPHS SHOWING METHODS ON THE BELMAR CONTRACTING CO., BITUMINOUS PENETRATION MACADAM JOB BETWEEN HARTFORD AND GRANVILLE, N. Y.

1. Northwest shovel loading a Mack truck in heavy rock cut near the quarry. 2. Autocar truck in hard going hauling rock to fill. 3. The quarry face showing the Mack truck and the Insley car used to haul rock to the crusher. 4. The crusher and screening plant showing the Insley car being dumped and truck loading from bins. 5. A view of the finished subgrade taken from one of the Mack trucks hauling stone to the spreaders. 6. Spreading stone with spreader box attached to the truck. 7. An interesting corner. In the foreground the stone has been spread over the asphalt on the bottom course, the black portion is the uncovered asphalt and the white section in the background is the unpenetrated bottom course. 8. Solvay distributor applying penetration asphalt to the bottom courses. 9. Austin 10-ton steam roller compacting the bottom course. 10. Detail of the distributor nozzles. 11. Hand spreading of No. 1 stone over the bottom course after penetrating with bituminous material A

spreader boxes, of which two were used, were made by the contractor and worked well, giving an even layer of stone with a very rapid dumping of the truck.

#### QUANTITIES

The subbase required 21,000 yards of stone, the bottom course 7,000 yards, the top course 7,100 yards, and a total of 235,000 gallons of the bituminous material were used at an average temperature of 320 to 335 degrees Fahrenheit.

#### UNIT PRICES

Unclassified excavation .....	\$ .90 per cubic yard
Foundation stone, in place and rolled .....	3.60 per cubic yard
Bottom stone in place and rolled .....	5.60 per cubic yard
Top course stone in place and rolled .....	6.00 per cubic yard
Asphalt, applied .....	.125 per gallon
2nd Class concrete .....	14.40 per cubic yard
1st Class concrete .....	20.00 per cubic yard
1st Class concrete for structures .....	16.75 per cubic yard
Cement delivered on job .....	3.40 per barrel
Timber piles, furnished, driven and sawed .....	1.00 per foot
C. L. pipe, 20-inch, in place .....	not
C. L. pipe, 24-inch, in place .....	5.70 per foot
C. L. pipe, 30-inch, in place .....	7.50 per foot
Trimming shoulders, ditches and slopes .....	10.00 per foot
	.10 per lin. ft. of road

All earth slopes are 1 on 1½, fills less than 4 feet are 1 on 4, fills over 4 feet are 1 on 1½ and rock slopes are 4 on 1.

#### BRIDGES

There are three bridges and two box culverts in-

cluded in this contract. The box culverts near the west end of the job are 6 x 6 and 6 x 8 feet. The bridge near the center of the job is a 22-foot structure of reinforced concrete built on piles. Bridge 4 about 1½ miles from the east end of the road is also a 22-foot structure but is built on rock. Bridge 5 at the east end has a 45-foot span and is built with special footings for the abutments on piers.

On Bridge 5 there are three piers under each abutment and two under each wing wall. The 2-inch wood sheet piling was driven with an Ingersoll-Rand air hammer and the coffer thus constructed was unwatered and kept dry with one Fairbanks-Morse 3-inch centrifugal and two Goulds diaphragm pumps. Concrete was placed under water with a tremie. The 1:2½:5 mix was first handled by a Jaeger 1-bag mixer, which was later replaced by a Koehring 2-bag mixer as greater capacity was needed.

#### PERSONNEL

This project is being built by the Belmar Contracting Co., Troy, N. Y., for which George Collier is Superintendent. W. C. LaRow is Engineer in Charge for the New York State Department of Public Works under Perry Filkin, District Engineer.



THE 6 x 8-FOOT REINFORCED CONCRETE CULVERT ON THE RITEWAY CONSTRUCTION CORP., JERICO TURNPIKE CONTRACT

At left, Domestic 4-inch centrifugal pump at left, inside forms for culvert shown in the center and subgrade ready for final grading in background. At right, detail of bracing and reinforcing with Knickerbocker mixer in center background

## A Drainage Problem on Culvert Construction

THE Riteway Construction Corp., New York, has Reconstruction Contract 1774 for building 5.59 miles of 30-foot reinforced concrete on the Jerico Turnpike. This project includes several small culverts and one 6 x 8-inch concrete box culvert measuring 112 feet, 1 inch long between the ends of the headwalls and 94 feet 6 inches between the ends of the culvert proper.

The drainage problem in erecting this structure was difficult, as well as the handling of traffic around the end of the structure during the work. As shown in one of the illustrations, it was necessary to build an earth dam at one end of the culvert excavation to hold back a reasonably large lake. The 4-inch Domestic centrifugal pump powered with a LeRoi engine handled the dewatering throughout the job. It was only necessary

to start it when water rose above the footings and the pump would prime itself and throw a stream fully 20 feet out into the lake and then subside as it dewatered the sump.

The quantities involved in this culvert structure included 320 cubic yards of unclassified excavation, 310 barrels of portland cement, 130 cubic yards of 1:2:3½ concrete, 58 cubic yards of second class concrete for foundation and 15,000 pounds of bar reinforcement.

The wing walls of the gravity type are 10 inches wide at the top and 3 feet, 9 inches wide at the bottom of the batter and with bases 5½ feet wide. The batter of one face is 4 inches to the foot. The culvert which runs diagonally across the road has a maximum thickness of one foot in the top under the roadway.

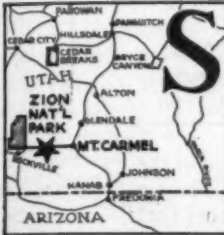
The accompanying illustrations show the general layout and also a detail of the bracing and reinforcing.

A Knickerbocker mixer was used for mixing all the concrete for both foundations and superstructure of this culvert.

# Difficult Road Work in the Zion Park-Mount Carmel Highway

By B. J. Finch

District Engineer, U. S. Bureau of Public Roads, Ogden, Utah



SINCE pioneer days, travel in Southern Utah has been confined to north and south routes with little opportunity for communication between these routes. The reason for this lies in the existence of a rugged mountain range, a branch of the Wasatch Mountains, extending for over 200

miles from a point near the center of the state to and beyond the Arizona border. In this distance there is at present only one pass over which a road can be kept open all the year and this pass is 150 miles from the southern border of the state.

Travel between Western and Central Utah was possible only during the summer season and then only over an unimproved road through Northern Arizona. This road was passable only under the best of conditions and was subject to damage from storms and by drifting sand. The route between Rockville, Utah, and Fredonia, Arizona, lay for 70 miles through uninhabited land with no taxable value. The state of Arizona had no interest in its improvement and the state of Utah could do nothing since the road lay outside the state.

## NECESSITY FOR NEW ROUTE

About 1916 the number of automobiles attempting to pass over this road began to increase so rapidly that it became apparent that some improvement must be made. Numerous efforts to secure improvement of the existing road failed and it was evident that a road must be constructed on a route lying entirely within Utah.

The traffic originating in Southern Utah and desiring to use this road was insufficient to warrant the heavy expenditures that would be required, but when the number of tourists visiting Zion Park and desiring to reach Bryce Canyon and the North Rim of the Grand Canyon began to reach thousands annually the problem assumed a serious nature.

Immediately north of Zion National Park the mountains rise abruptly to an elevation of 10,000 feet or more and a route to be passable during all the year must lie below 8,000 feet in that latitude. This confined the problem to one of finding a route east from Zion Park. After long study, two possible locations were found and surveys made over both routes. Estimates were prepared and fortunately the less costly route proved to be the one having most advantages in other respects.

The objectives to be accomplished by this route were: 1, to provide a through highway between U. S. Routes 89 and 91; north of the Grand Canyon; 2, to provide an

all-year road for the residents of Kane County to the railroad at Cedar City; 3, to make possible travel from the floor of the valley in the Park to the East Rim and on to Bryce Canyon and the North Rim. In the development of the problem another factor soon became apparent and that was the construction of the most scenic and spectacular highway in America and probably in the World.

## CONSTRUCTION STARTED IN 1927

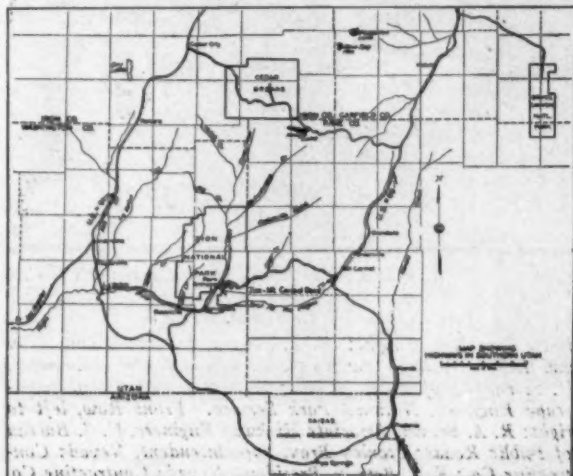
Surveys began in 1925, but it was not until 1927 that an agreement of all concerned was reached and actual construction began. The route selected was 25 miles in length, 8½ miles being within Zion National Park and 16½ miles in Kane County east of the Park boundary. It was agreed that the part within the Park should be built from National Park road funds, and that the part east of the Park should be built as a Federal Aid road project, the State providing 26 per cent and the Government 74 per cent of the cost of this portion.

## BIDS ON SECTIONS 1 AND 2

Plans were completed and 13 proposals for the construction of the first section, 5.02 miles in length, were received on August 31, 1927. These bids ranged from \$607,058.00 to \$950,788.00 and the estimated quantities of the major items were:

Unclassified excavation .....	289,900 cu. yds.
Solid rock excavation .....	3,000 cu. yds.
Unclassified excavation for structures .....	1,825 cu. yds.
Tunnel .....	5,582 lin. ft.
Overhaul .....	460,200 sta. yds.
Cement rubble masonry .....	1,461 cu. yds.
Guard rail, cement rubble masonry .....	11,215 lin. ft.
Solid rock gallery excavation .....	4,200 cu. yds.

The contract was awarded to the Nevada Contracting Co., of Fallon, Nevada, and work began on September 27, 1927.







#### TEMPORARY ROAD, THE FIRST WORK

The first equipment to arrive on the job was two  $\frac{3}{4}$ -yard and one  $1\frac{1}{4}$ -yard P & H gasoline shovels. These began work as rapidly as possible, it being necessary for the shovels to cut a narrow temporary road for about  $1\frac{1}{2}$  miles along the line of the future road. The specifications were very definite on the question of landscape preservation and no temporary roads which would leave a permanent scar were permitted. The material to be excavated in the first 4 miles consisted of sandstone talus with from 35 to 45 per cent solid sandstone.

#### PREPARATION FOR TUNNEL DRIVING

Meanwhile the contractor was erecting a camp, about midway of the work, and installing machinery for the tunnel work. Since the construction of the tunnel would require the greater part of the allotted time it was necessary that that work be carried on at the same time as the grading between the lower end of the proj-

ect and the tunnel. This necessitated the installation of compressors, drills and mucking machinery before the completion of the road to the tunnel portal. To do this meant the handling of much machinery and materials by some other means than by road. An inclined cableway 1,200 feet long was installed to handle this material, picking it up from the road in the bottom of the canyon and carrying it up 400 feet in elevation to the west end of the plateau on which the camp was constructed. From here the material was hauled on rough sleds to needed points.

#### TRUCKS USED ON GRADING

For the grading work, in addition to the shovels, there were six Mack 5-ton trucks with solid tires. It was soon found that solid tires would not work in the sand and the trucks were then equipped with pneumatic tires after which more satisfactory operation was secured.

#### TUNNEL CONSTRUCTION

For the tunnel work air was supplied by two Sullivan W. J. 3, angle compound compressors, each 17 x 10 $\frac{1}{4}$  x 12 inches in size and each operated by a 125-horsepower Fairbanks-Morse electric motor. Before these compressors were installed work began, using portable compressors which were later used in the grading work below the tunnels. Drilling was done with stoping, drills and mucking in the pilot tunnel, partly by hand and partly by a Butler shovel and a scraper slide.

As will be noted from the map, the tunnel line consists of a series of tangents with connecting curves. It was impossible to start the work at the west portal and carry it through from that end, first, because there was no road to the portal, and secondly, because, on account of time limitation, it was necessary to work the pilot tunnel from several headings at the same time. For the control of the work a base line was established along the slopes below the base of the cliffs and carefully checked to eliminate errors. From this base line side lines were carried to the cliff face, by measurement and triangulation, at points where it was desired to open up galleries to reach the tunnel line. When the galleries had been carried back to the center line of the tunnel this center line was established from the base line and projected toward the next gallery.

Work on the tunnel began at Gallery No. 1 at which



THE CONTRACTORS AND ENGINEERS RESPONSIBLE FOR THE SUCCESS OF THE WORK ON THE ZION PARK-MOUNT CARMEL HIGHWAY

Back Row, left to right: E. T. Scoyen, Superintendent, Zion and Bryce National Parks; B. F. Finch, District Engineer, U. S. Bureau of Public Roads; H. Langley, Assistant Landscape Engineer, National Park Service. Front Row, left to right: R. A. Brown, Associate Highway Engineer, U. S. Bureau of Public Roads; Stanley Bray, Superintendent, Nevada Contracting Co.; E. S. Berney, President, Nevada Contracting Co.

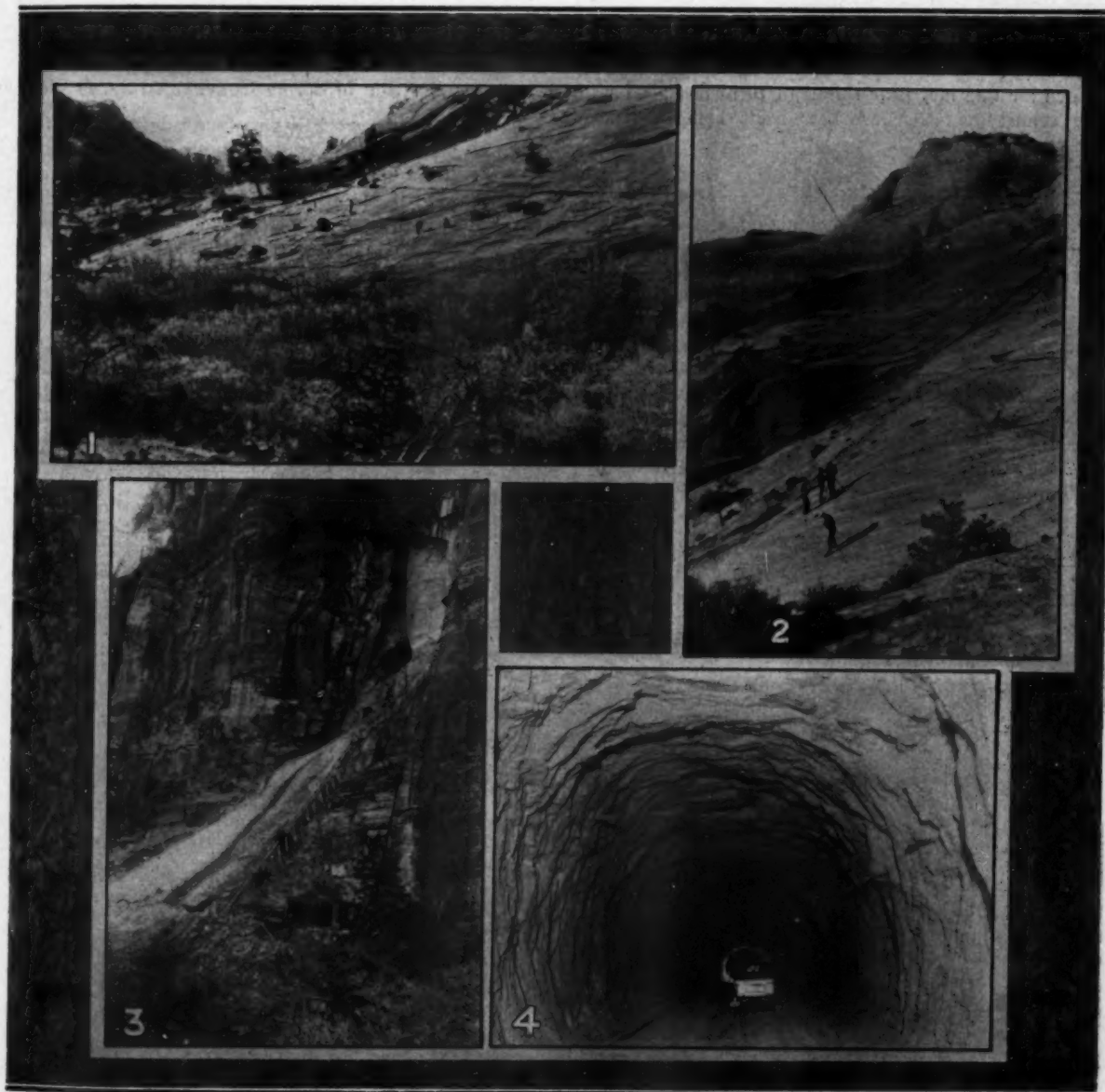
point it was possible to reach the elevation of the tunnel from a short ladder. A small opening was carried back to the tunnel line and grade and then broken out longitudinally and vertically until an opening 80 feet long and 35 feet high at the cliff face was obtained. Meanwhile work had been under way at Gallery 6, immediately west of Gallery 1, where it was necessary to build a scaffold about 40 feet high to reach the cliff face at grade elevation. When these two galleries were completed, pilot tunnels were started in both directions from each gallery, thus giving four working headings.

The pilot tunnel was 9 x 9 feet and was run on the grade of the completed tunnel. This pilot was carried through between two consecutive galleries before enlargement to the full size tunnel was started so as to provide ventilation.

Similar work was done at Galleries 2 and 3. At Gallery 4 the grade was nearly 200 feet above the base of the cliff and here a stope or raise was driven just inside the face of the cliff to the grade elevation just outside the tunnel. This stope was about 4 x 8 feet divided in two parts by a timber bulkhead so that one side carried a ladder and hoist and the other was used to dispose of muck from the stope and from the pilot tunnel until an opening could be made to the cliff face at grade.

#### MUCKING THE ENLARGED TUNNEL

When the road had been built to the west portal, a Bucyrus-Erie  $\frac{1}{2}$ -yard air shovel was used for handling the muck from the enlargement of the tunnel. This muck was loaded on trucks and hauled to the portal



#### FROM SURVEYING TO THE FINISHED PRODUCT

1 and 2. Surveying on Section 3. 3. The wooden tramway which provided such efficient service on Section 3. 4. A view of the unlined tunnel.

or to the nearest gallery as work proceeded. For about 125 feet from the portal, shattered rock was encountered and timbering in advance of the shovel was necessary. This delayed the work at the start but later sections were timbered before the shovel reached those points so that progress after the first few hundred feet was more rapid and uniform.

### DRILLING

In the enlargement of the tunnel a ring drilling system was used. Columns were set at 3-foot intervals on the center line of the tunnel. Stopping drills of the self-rotating type were set on arms with a semi-circular plate with lines radiating from the center at uniform angles. All the holes required for one round were drilled from a single setting of the column. Since several columns could be used at the same time drilling proceeded rapidly.

To provide access to the work from the camp, a trail was built along the slope near the base of the cliff. A 4-inch air line laid near this trail furnished air for all the tunnel operations, smaller leads being taken off wherever necessary.

### CLAY SURFACING USED ON SAND

The work originally contemplated under this contract included gravel surfacing, but it was decided with the consent of the contractor to eliminate this item and wait for settlement of the fills before placing any surfacing. When the grading was completed the roadbed was principally sand, and to provide a foundation for the future surface a layer of reddish clay from one of the cuts was spread over the whole roadway to a depth of 4 inches. This clay combined with the sand to provide an exceptional temporary surface which stood up well under the worst conditions for the hauling necessary for the work on the next section.

### BIDS OF SECTION 3

The contract on the first section was completed on December 20, 1928. Meanwhile bids were received on September 27, 1928, for the grading and structures on

Section 3, 3½ miles in length. Four bids were received ranging from \$315,906.40 to \$418,215.95. The principal items of work contemplated were:

Unclassified excavation .....	150,100 cu. yds.
Unclassified excavation for structures....	1,500 cu. yds.
Unclassified excavation channel change....	4,200 cu. yds.
Overhaul .....	41,610 sta. yds.
Finishing graded roadway.....	3.41 miles
Class A concrete .....	142 cu. yds.
Class D concrete .....	143 cu. yds.
Tunnel .....	479 lin. ft.
Cement rubble masonry arch culverts....	1,850 cu. yds.
Cement rubble masonry guardrail.....	2,560 lin. ft.
Cement rubble masonry retaining walls..	1,430 cu. yds.

The Nevada Contracting Co., was low bidder on this contract and work began shortly after October 1, 1928. About two miles of the grading on the east end near the Park boundary was sublet to the Raleigh-Lang Co., who had just completed a section of the Federal Aid project. This company placed three Northwest shovels on this section and the Nevada Contracting Co., had their three P & H shovels working on the 1½ miles near the end of the tunnel on Section 2.

### TUNNELS REPLACE MASONRY CULVERT TO SPEED WORK

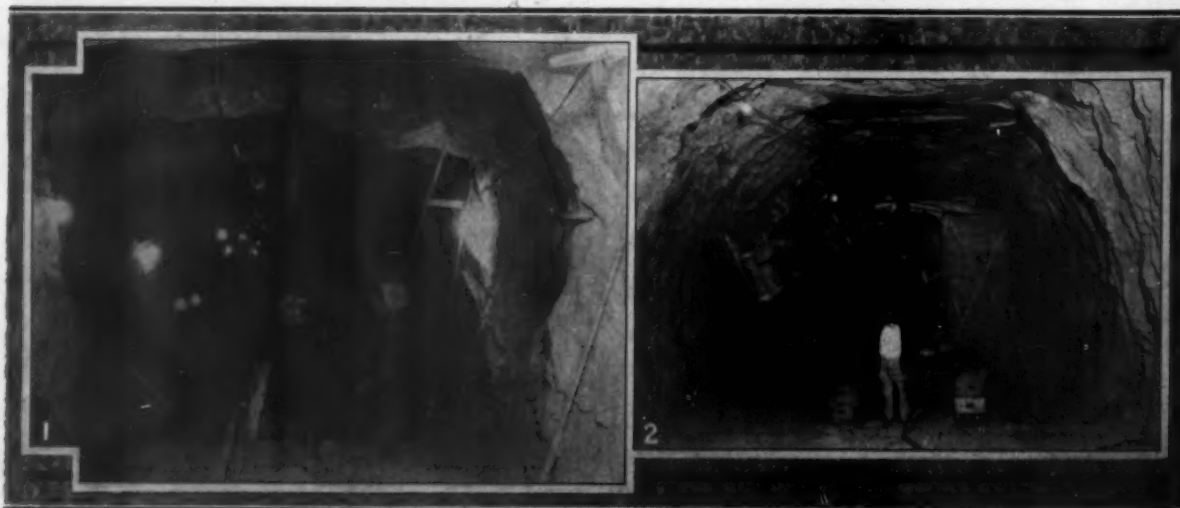
To expedite the work it was found desirable at four places to eliminate the masonry arch culverts and substitute tunnels, through adjoining rock points, for drainage purposes. This made it possible to fill the present waterways as the grading proceeded and did not hold up the shovels until structures could be completed. All grading work on the Park section was completed by August 1, 1929.

### BIDS FOR SURFACING

On May 28, 1929, bids were received for the surfacing of Sections 1 and 2. Four bids were received, ranging from \$156,469.00 to \$228,822.00. The principal items of work were:

Concrete pavement (tunnel) .....	12,950 sq. yds.
Concrete curb .....	11,520 lin. ft.
Cement rubble masonry guardrail.....	660 cu. yds.
Dry rubble masonry guardrail.....	600 cu. yds.
Crushed gravel or stone.....	4,550 cu. yds.
Asphaltic oil .....	350 tons
Timber tunnel lining .....	404 lin. ft.
Gunite tunnel lining .....	600 cu. yds.
Concrete tunnel lining .....	275 cu. yds.

The Nevada Contracting Co., was again low bidder



### DRILLING AND MUCKING OPERATIONS

1. Drills and columns in the pilot tunnel. 2. The Bucyrus-Erie air shovel in the tunnel





LOOKING EAST FROM STATION 165, SHOWING PINE CREEK ARCH

The East Portal is above and beyond the arch. Waste from Gallery No. 3 shows in the shadow

and work on this contract has begun. This work should be completed about December 1, 1929. A mixed asphaltic gravel surface is to be provided outside the tunnel and a concrete pavement in the tunnel.

#### BRIDGES

Two bridges to be constructed near the beginning of the project are not yet under contract but the construction of these bridges will not interfere with use of the road since by-passes can be secured.

#### WORK ON FEDERAL AID PROJECT

Meanwhile work has been carried on nearly to completion on the 16½-mile Federal Aid project. The contractors on this work were Reynolds Ely Co., and Raleigh-Lang Co., on the grading and structures and A. G. Young & Co., on the gravel surfacing. Several large bridge structures including concrete girders, concrete arches, timber trestles and one steel span were included in this section and the work, while not as spectacular as that within the Park, is heavy and costly.

On the twenty-five miles, the completed quantities will be about as follows:

Clearing .....	72 acres
Common excavation .....	71,612 cu. yds.
Intermediate excavation .....	11,060 cu. yds.
Solid rock excavation .....	83,703 cu. yds.
Unclassified excavation .....	710,291 cu. yds.
Borrow .....	36,049 cu. yds.
Overhaul .....	1,062,892 sta. yds.
Overhaul (surfacing) .....	220 yd. mi.
Structure excavation .....	13,639 cu. yds.
Channel change excavation .....	28,500 cu. yds.
Concrete, Class A .....	2,078 cu. yds.
Concrete, Class B .....	355 cu. yds.
Reinforcing steel .....	410,376 lbs.
Structural steel .....	116 tons
12-inch corrugated metal pipe .....	30 lin. ft.
18-inch corrugated metal pipe .....	4,664 lin. ft.
24-inch corrugated metal pipe .....	3,022 lin. ft.
30-inch corrugated metal pipe .....	404 lin. ft.
36-inch corrugated metal pipe .....	1,878 lin. ft.
Wooden guardrail .....	5,706 lin. ft.
Cement rubble masonry guardrail .....	7,210 lin. ft.
Dry rubble masonry guardrail .....	3,600 lin. ft.
Cement rubble masonry retaining walls .....	2,783 cu. yds.
Gravel surface loading .....	42,000 cu. yds.
Gravel surface hauling .....	126,000 yd. mi.
Gravel surface placing .....	25 miles
Subbase .....	2,500 cu. yds.
Binder .....	1,000 cu. yds.
Piling .....	2,111 lin. ft.
Bituminous surface bridge floor .....	400 sq. yds.
Tunnel (22 feet wide, 16 feet high) .....	6,086 lin. ft.
Timber tunnel lining .....	980 lin. ft.
Concrete tunnel lining .....	275 cu. yds.
Water tunnel (9 feet x 9 feet) .....	343 lin. ft.

Masonry arch culverts .....	1,500 cu. yds.
Concrete pavement .....	12,950 sq. yds.
Concrete curb .....	11,520 lin. ft.
Asphaltic oil .....	650 tons
Gunitite tunnel lining .....	600 cu. yds.
Masonry tunnel portal .....	1 each

These quantities are in addition to those in the two bridges yet to be placed under contract, the cost of which will approximate \$150,000. The cost of the project will be \$1,438,000 for the 8½ miles within the Park and \$485,000 for the 16½ miles in the Federal Aid Project, or a total cost of \$1,912,000.

#### PERSONNEL

All major roads in the National Parks are built by the U. S. Bureau of Public Roads, Thomas H. MacDonald, Chief. Dr. L. I. Hewes, Deputy Chief Engineer, in charge of the Regional Office at San Francisco, has charge of all National Park and National Forest road work in the Western States.

The road within the Park has been built under the direction of R. A. Brown, Associate Highway Engineer, U. S. Bureau of Public Roads. Especial mention should be made of the work of T. A. Jones, Chief of Party, who had charge of the location and construction of the tunnel and Roy Davis, Junior Highway Engineer, who handled the engineering work on the road outside the tunnel. E. T. Scoyen, Superintendent of Zion and Bryce National Parks, has given much time to the supervision and payments of the contracts. The work is being done under the supervision of District No. 12, U. S. Bureau of Public Roads, B. J. Finch, District Engineer, with R. R. Mitchell, Highway Engineer, in charge of National Park and National Forest Roads. Landscape engineering has been under the direction of T. C. Vint, Landscape Engineer, National Park Service, with H. Langley, Assistant Landscape Engineer, assisting.

#### Strength of Concrete Affected by Type of Coarse Aggregate

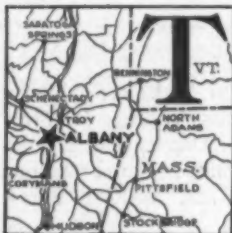
THE tensile, flexural and compressive strength of concrete are affected by the character of coarse aggregate used, according to conclusions arrived at by the Division of Tests, Bureau of Public Roads, as the result of a study of the effect of type and gradation of coarse aggregate on the strength of concrete.

Based on the variables included in this investigation it was concluded that the tensile, flexural and compressive strength of concrete are affected by the character of the coarse aggregate used; that the tensile and flexural strength are affected to a greater extent than the compressive strength; that for a given aggregate there is a fairly well defined relation between the strength of the concrete and water-cement ratio; that variations in the character of the coarse aggregates, other things being equal, may result in a difference in flexural strength equal to that produced by an appreciable change in the water-cement ratio for any given aggregate; that there is a fairly definite relation between certain mineralogical characteristics of the coarse aggregates and the strength of concrete, calcareous aggregates giving in general consistently higher flexural and tensile strength than the siliceous aggregates; that in general aggregates having rounded fragments produce concrete of lower flexural and tensile strength than aggregates which are composed wholly or in part of crushed fragments; that, within the limits of this study, variations in grading of coarse aggregates have no consistent effect on the strength of the concrete; and lastly, that, within the range in quality covered by this study, there is no relation between the quality of the coarse aggregate, as measured by the abrasion test, and the strength of the concrete.

# A Commercial Central Mixing Concrete Plant in Albany, New York

By Frank I. Ginsberg

Chief Engineer, H. O. Penn Machinery Co., New York



THE rapid development of the concrete industry has brought into existence the commercial central mixing plant. The two most important reasons for this type of plant seem to be, first, the accurate control of materials that go to make good concrete, and, secondly, the economic advantages that have developed, due to carefully laid-out processes of mass production as applied to mixed concrete. The plant of the Albany Trucking Corp., at Albany, N. Y., is a good example of what can be accomplished in that direction.

## PLANT WELL-LOCATED FOR BUSINESS

The plant is located on the bottom of an old pit adjacent to the Albany Gravel Co., about a mile and a half from the center of town, and has a nearly perfect location for this kind of business. The present plant of the gravel company is only a few hundred feet from the mixing plant and the material is hauled by truck from the piles of washed and graded materials and dumped into a hopper feeding a belt conveyor leading into the Butler bins. The belt discharges into a revolving hopper on top of the bin, so that this material can be placed into any one of the four compartments. There is also a bucket elevator for elevating crushed stone from cars.

## HANDLING OF RAW MATERIAL

The cement is delivered in bulk in cars direct from the mill, and is unloaded by a power scraper into a hopper and then pumped by air into an elevated cement bin of about 150 tons capacity. This bin has three

compartments for three different brands of cement. Each compartment is controlled by a leak-proof gate, feeding into a special screw conveyor, which in turn feeds into a cement storage hopper of about 60 cubic feet capacity. From here the cement is fed into a Butler weighing hopper with a beam and dial combination scale, which accurately weighs each batch of cement into the batch hopper of the concrete mixer.

All of the levers controlling the aggregates are banked directly in front of the operator, so that he does not have to move from his position to handle any or all of the operations involving the measuring and mixing of a complete batch of concrete. The gates controlling the aggregates are directly over the mixer hoppers and are of the radial type with direct cut-off.

## MIX CAN BE CHANGED QUICKLY

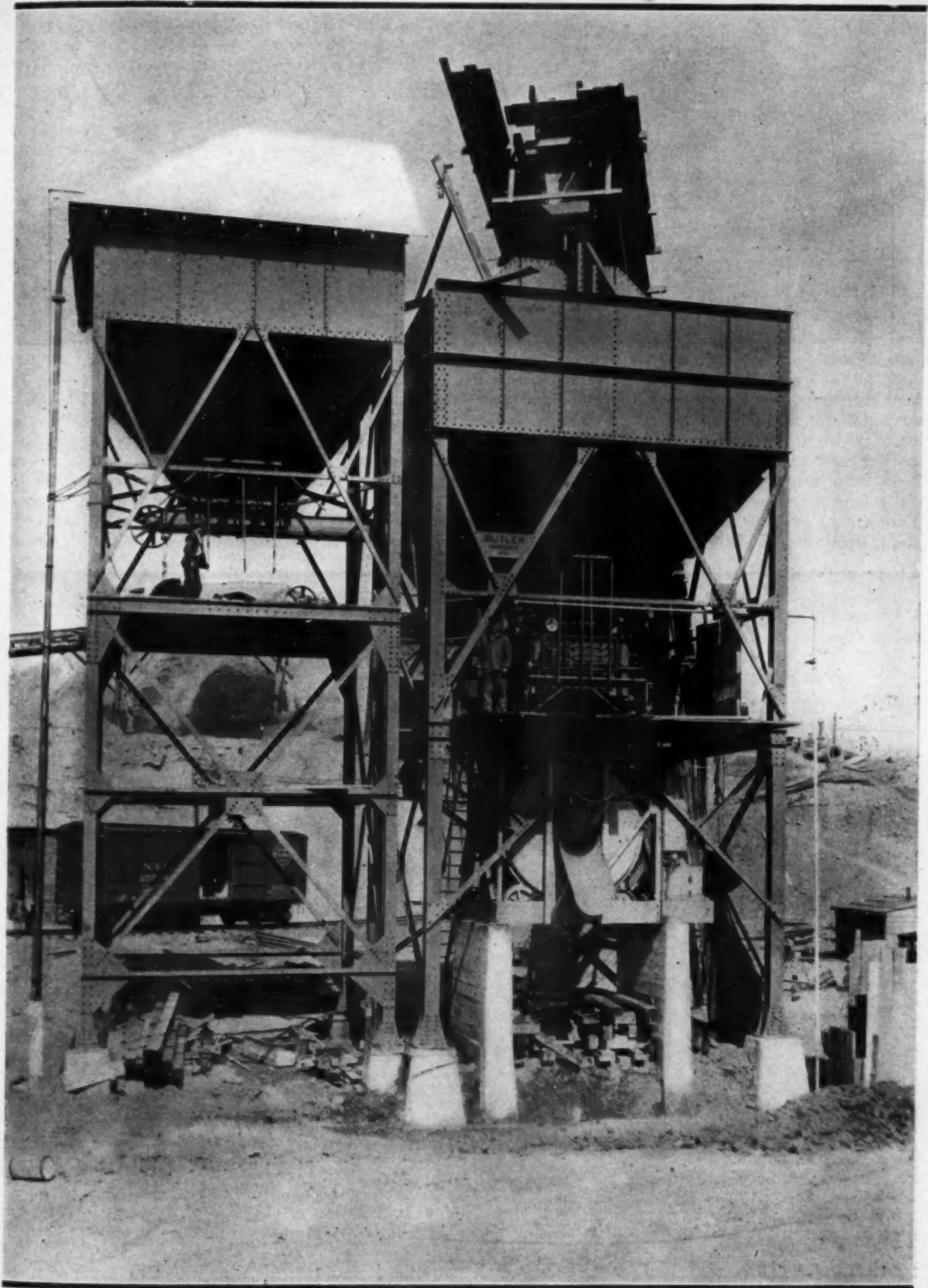
The materials are allowed to flow into a weighing hopper suspended on an all-steel three-beam scale with an indicator dial. This arrangement is accurate and very flexible, permitting rapid changes to conform to various types of concrete required. To change, for example, from a 1:2:4 to 1:2½:5 mix takes less than a quarter of a minute. The tripping of a lever drops all this material directly into the Rex 84-S mixer, which is equipped with batch meter controls to insure a definite mixing time. The entire batch is then discharged into a 3-yard specially designed Bartlett & Snow truck body, which is quickly on its way to deliver the concrete to the job. Mixed concrete can be hauled in these bodies for long distances without loss of strength or workability.

## SPECIAL FEATURES

There are a number of special features in connection with this plant. First, the control of all operations is



Conveyor Handling Graded Aggregate from Hopper to the Butler Bins



*The Central Mixing Plant of the Albany Trucking Corp., in Albany, N. Y.*





*Truck-Mounted Bartlett & Snow Body in Dumping Position*



*Delivering Concrete to a Foundation Job*

from the operator's platform. The diversion spout on the top of the bin is controlled by a bull wheel cable leading down to the platform, and can be swivelled into any compartment of the storage bin. Another feature is the water control. The water passes through a specially designed water meter with a dial arrangement. This dial can be set for any amount of water required, and the pull of a small trip cord lets this exact amount

of water flow into a container and then into the concrete mixer. The accuracy of the Automatic Meter is not affected by any variation in pressure or temperature of the water. Hot or cold water may be used, thus allowing for the heating of water for winter concrete.

The Rex concrete mixer is designed to handle 3 cubic yards of mixed concrete, and is known as an 84-S. It is electrically driven, with enclosed reduction gearing



*The Complete Central Mixing Plant of the Albany Trucking Corp., with a Part of the Delivery Fleet in the Foreground and the Storage Piles of Aggregate in the Background*

and chain drive. The mixer has a power discharge operated by a pedal trip on the operator's platform. All switches are of the remote control type, and are located within the immediate reach of the operator. This includes all belt conveyors, bucket elevators, mixer motor and all other parts. All of the various units comprising this plant are standard units. This eliminates all special design, and was responsible for the extremely low cost of installation on this particular operation.

This plant, which has a normal capacity of 750 cubic yards per day, was designed by Frank I. Ginsberg, Chief Engineer of the H. O. Penn Machinery Co., New York, who made the installation, working in collaboration with Neil D. Crowley, President and General Manager of the Albany Trucking Corp.

### Cutting Material Handling Costs

**"C**UTTING Material Handling Costs," by C. M. Ballard, and edited by D. C. Sherman, has recently been published by the Williamsport Wire Rope Co., Williamsport, Pa. This book is a discussion of modern methods of handling materials and is intended for the use of all those who are faced with the problem of ascertaining the most economical method of material transportation. For the most part the book is readily understandable by the layman without any technical knowledge.

The aerial method of transportation is discussed in all its phases, its cost compared with other means of transporting materials, descriptions of aerial tramways and cableways are given and an analysis of conditions under which they can be profitably employed.

There is the mono-cable type, particularly advantageous in cases where the tramway is fully automatic, the carriers being permanently fastened to the cable, and when the capacity is small and the distance short. The most modern large tramways are generally bi-cable, of which there are three kinds: single reversible, double reversible or jig-back and the continuous, the names of which describe the construction and purpose of each.

The uses of these various types of tramways, the kinds of cable to use with each, the many carriers and buckets and their purposes, towers and structures and valuable mathematical data are all given in a detailed and understandable fashion, with many illustrations.

The book should be of considerable value to those confronted with material handling problems as this volume covers the field from all angles. Price: \$3.00.

### The Importance of Subgrades and Pavement Bases

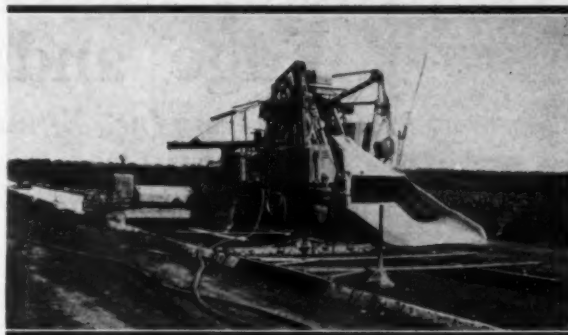
**A** STUDY of subgrades and pavement bases as a beginning for future road building is being made by the American Road Builders' Association through a special committee. In connection with this work, conferences are being held with road building experts throughout the entire country.

The Association has pointed out that much money can be saved in the road construction of the next decade by the proper preparation of the natural earth foundation. Proper subgrade is as important in its relation to the road as a foundation is to a building but not sufficient time and thought have been spent on the subject.

The purpose of the committee is to make a thorough study of road foundations with a view to improving them so that the roads they carry will satisfy the requirements of both modern and future traffic, increasing both the value and the life of the roads.

The results of this survey will be presented before the American Road Builders' Association convention when it is held next January in Atlantic City, N. J.

### All Alone



*In the majesty of its own solitude this paver and its finisher stood for days awaiting an even chance to start work on the pavement slab. The contractor fretted, and perhaps chewed his cigar, all because old Jupiter Pluvius would have his way and sprinkle the subgrade excessively on alternate days so that it had no chance to dry out. There's no money going into a contractor's pocket when the concrete is not going into the road*

### Waste, Not High Wages, Makes Building Costly

**S**O far as buildings are concerned, the United States is like a family which has grown rich, stated Morton C. Tuttle, President, Mortor C. Tuttle Co., Boston, Mass., in a recent article. As its wealth increased, so has its bill for raiment. The cost of buildings like the cost of family clothing is important, yet of equal importance is the cost of *what* we are building.

The efficiency of labor and higher wage levels are usually blamed for the higher cost of building. When the discussion of the cost of a building is started, unfavorable comments are often heard on the willingness, the effectiveness and the skill of the construction forces on the job. However, the complexity of our buildings and our higher wage levels, natural accompaniments of our higher standards of living, do not account for the high cost of building. Facts will show rather that a significant part of this cost is unnecessary waste resulting directly from the strange failure to adapt procedure to modern requirements. Better building values are definitely within the reach of owners who will apply to it the simple principles to which they owe their own business success.

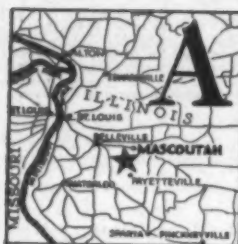
Some of the primary considerations in building are type, size, arrangement and choice of materials. If the least expensive of these is adequate for the builder, the choice of anything else is extravagant. If the building chosen is not of the most economical type, not an economical arrangement and size, and not of the most economical materials, this means that before a single shovelful of earth is turned, values have been lost which no subsequent savings can restore.

After the type of building is selected, comes the choice of design and the details. For almost every part of the construction, there is available a selection of details, whose designing or assembling costs vary widely. From the angle of sound engineering, use or appearance, the extra cost of a detail may yield no extra value whatever. Yet it commonly happens that complicated details are used where simpler details are available; that costly materials are used where economical materials suffice. Obviously an economical structure is the sum of economical details. Yet the average building design will not bear the test of intelligent cost analysis.

Mr. Tuttle urges that the same business principles of cost analysis and careful procedure be applied to the planning and building of new structures as are applied to other businesses and considerable of the high cost of building will be eliminated in the waste that will be done away with by such a procedure.

# Contractor Makes Novel Straight-Edge and Template

*Mautz & Oren, Inc., Effingham, Ill., Shows Ingenuity  
And Makes Good Progress on 18-Foot Slab  
On Illinois Section 112, Route 150*



SIDE from averaging 90 to 100 feet per hour of standard 9-7-9-inch 18-foot Illinois pavement and 1,000 to 1,050 feet per day, Mautz & Oren, Inc., have developed several novel small pieces of equipment which give better results and make for easier operation on the road.

## THE STRAIGHT-EDGE

The usual straight-edge used on the road is a cumbersome affair and the man using it is tired out all too soon. In order to lighten the straight-edge and still retain its effectiveness and at the same time insure it against all warping the unit has been made up simply as a bowed strip of wood with a piano wire for the testing edge. The wire is held in position by a simple notched bent strip of metal at the ends of the bowed wood strip.

## SCRATCH TEMPLATE

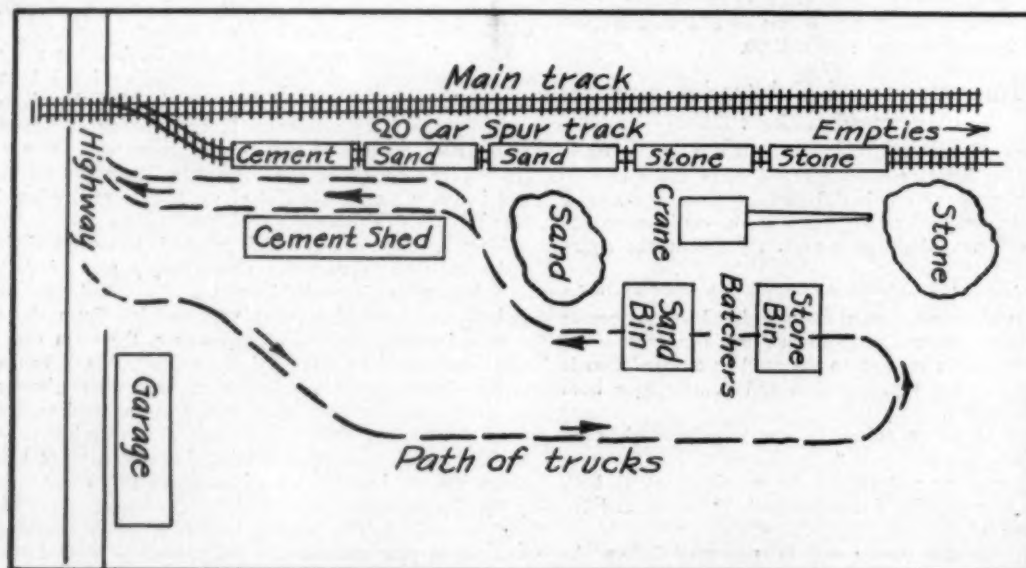
All kinds of scratch templates are seen on road jobs. Some are merely wooden planks with some spikes driven into the edge of the plank and others are more elaborate. The template developed and used by Mautz & Oren is rather unusual. It consists of an I-beam supported by a two-wheel carriage at each form. The template is hooked to the Rex paver so that the whole unit moves as a single piece of equipment. The teeth

for checking the subgrade are sharpened pieces of reinforcing steel held in place in holes drilled in the bottom flange of the I-beam by U-bolts. It is heavy enough to insure an accurate check, the teeth are readily adjusted for wear and no one has to think about moving the template as the paver moves ahead.

## AN EXPANSION JOINT SPACER

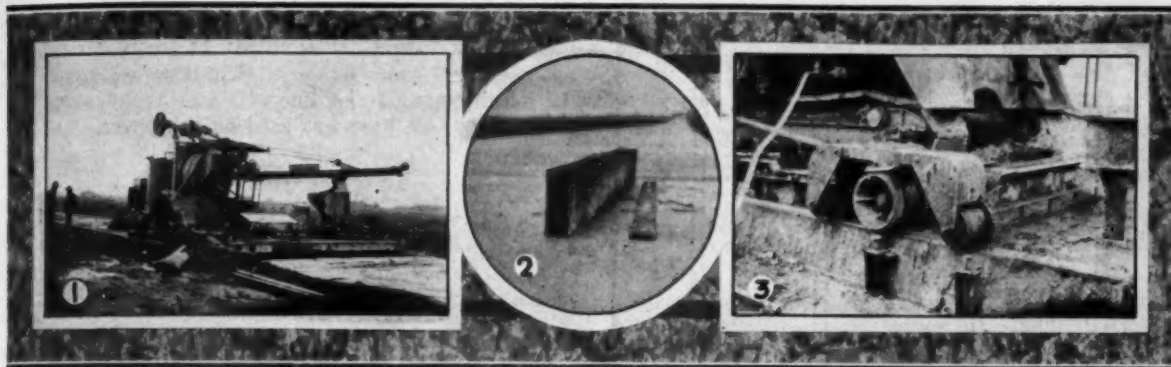
Illinois specifications call for a 4-inch expansion joint every 1,000 feet of the pavement slab. If the contractor is within a few feet of the normal position of an expansion joint at the end of a day's run he is permitted to install it at that point. The expansion joint is a complete 4-inch break in the pavement and is left by the contractor as such. It is the function of the maintenance crew of the State Highway Department to fill the joint with asphalt. Mautz & Oren have developed a collapsible form for the expansion joint which makes it easy to remove and insures the joint being accurate and uniform.

Each form consists of 3 pieces of two steel plates  $\frac{1}{4}$  inch x 9 inches x 6 feet with spacers welded to them so that bolts can be slipped through slots in the upper spacers and the forms held rigidly to the proper dimension. At the top a  $\frac{1}{4}$ -inch steel plate fits so that it is flush with the top of the concrete slab, thus permitting the finisher to work over the joint without interference. To remove the spacer it is only necessary to loosen the bolts and collapse the form. Three of the forms are used across the 18-foot slab.



Layout of the Unloading and Batching Plant of Mautz & Oren, Inc., for the Mascoutah Job





DETAILS OF EQUIPMENT USED BY MAUTZ & OREN ON JOB NEAR MASCOUTAH, ILL.

1. The Rex 27-E paver with the specially fabricated scratch template and the Ord finisher in the foreground. 2. The expansion joint spacer shown in detail in the accompanying diagram. 3. The scratch template on rollers and attached to the Koehring planer so that they moved as a unit

#### ROUGH GRADING

For rough grading on this job the contractor was required to move about 140,000 yards of earth, of which 50,000 yards was borrow and 60,000 yards of which was sub-bed. A Caterpillar Sixty was used to haul a Russell 420 elevating grader feeding to a 5½-yard Euclid crawler wagon hauled by a Caterpillar Thirty and 2 units of two 1½-yard Western wagons hauled by Caterpillar Thirty.

#### FINE GRADE AND FORM SETTING

On the fine grade rotary scrapers or fresnos hauled by a Caterpillar Thirty were used with 8 men and 3 teams hauling forms and miscellaneous other work. In setting the forms there was 1 form setter and a helper to each side. Inasmuch as two kinds of forms were used on this job it was aimed to use the Metaforms on one side and Heltzel forms on the other. A Ted Carr formgrader was used to cut the grade for the forms. The forms were maintained uniformly about 800 to 1,000 feet ahead of the Rex 27-E paver. A Hug subgrade planer was used with a Caterpillar Thirty to give the final shape to the subgrade. The Thirty was also used on the revolving fresnos to clean up the grade where high spots were removed by the planer.

#### BATCHING PLANT

Stone was purchased from the Stolle Quarry Co., St. Louis, and delivered by rail. Sand came from the Central Materials Co., of St. Louis, and was delivered also by rail to a spur at New Baden, Ill., which is located at about the mid point of the job, giving an average haul of 2 miles to cover the 8.02-mile section. A Koehring crane with 1-yard Blaw Knox clamshell bucket unloaded the gondola cars direct to the Johnson steel bin with batcher for the stone and to a wooden bin with a Johnson batcher for the sand. Stockpiles of sufficient material for a 3 days' run were maintained.

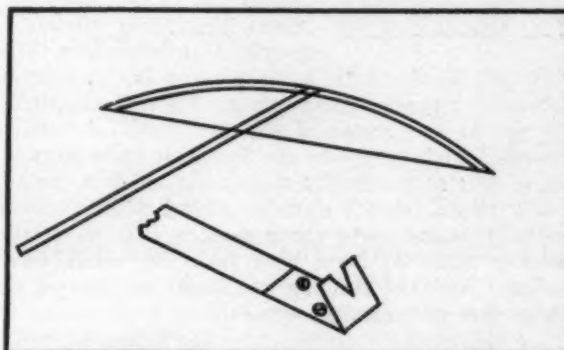
Cement from the Missouri Portland Cement Co., was unloaded direct to the trucks, 6 bags per batch, the bags being emptied after the truck had been turned on the turntable. A cement house capable of storing about 5 cars of cement was maintained against delay. The trucks were all Hugs except a few hired machines for the longest hauls.

The loading plant was so arranged that there was no backing of trucks necessary. The trucks entered from the main road, went past the garage and drove to the back of the plant where the stone stockpile and the stone batcher were located. The trucks drove under the stone batcher, received the batch, then went ahead to the sand batcher and from there to the cement car where the bags were thrown on. The spur track at New Baden had a capacity of 20 cars with ample space for the empties for any one day beyond the stone stock pile. A nominal 1:2:3½ mix was used.

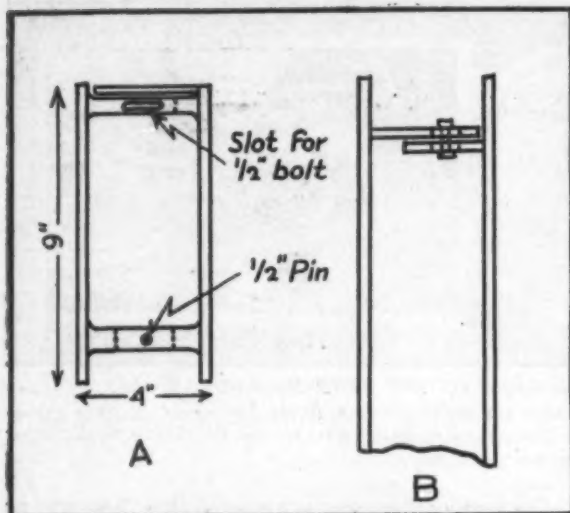
#### CONCRETING ORGANIZATION

On arrival at the subgrade ahead of the paver the trucks were turned by one man on the Hug turntable, they then backed to a small platform from which 2 men stepped onto the top of the truck and emptied the sacks. One man dumped the trucks at the paver skip, there was one paver operator, 2 men on subgrade behind the paver cleaning out behind the Koehring planer, 2 puddlers, 1 man setting the Kahlman center strip and the side rods, 1 extra man to spade and to help the puddlers as necessary, 1 operator for the Ord finisher with a helper, 2 men on the 10-foot longitudinal float working from two bridges, 1 hand finisher and 2 men who handled the burlap, spread the calcium chloride, using an old float, and who make themselves generally useful sprinkling the burlap as necessary, and hauling steel as needed.

Instead of the old metal roller formerly used to re-



Bow String Straight-Edge Showing Complete Bow and Below, the Bent Notched Metal Strip Used to Fasten the Wire



THE EXPANSION JOINT SPACING DEVICE

A. End view showing top flush plate and slot for bolt. B. Top view with top plate removed showing bolt in place

move excess water from the surface of the concrete before final finishing, the contractor used a garden hose with handles made of pieces of reinforcing steel. This was dragged across the slab and very effectively removed the excess water and laitance.

#### WATER SUPPLY

The water supply was not a problem on this job as

several small streams with plenty of water crossed the line of work. The C. H. & E. No. 11 pump was set up about every 2 miles as the work progressed supplying the job through a 2-inch line with taps about every 160 feet. A 100-foot hose was used on the paver.

#### DRAINAGE STRUCTURES

There were 20 culverts on the job ranging from  $1\frac{1}{2} \times 1\frac{1}{2}$  feet to  $6 \times 8$  feet and there were about 25 side entrance drains made up of 12 and 15-inch tile encased with 6 inches of concrete and with headwalls.

#### SHOULDERS

The final work on the shoulders was handled with the elevating grader throwing the dirt from the ditch to the shoulder where needed or to the crawler wagon or trucks which hauled it to weak spots. The shoulders were shaped with a blade grader hauled by the Thirty while the Sixty was used on the elevating grader.

#### PERSONNEL

The contract for this work was awarded to Mautz & Oren, Inc., in November, 1928, and work was not started until April 2, 1929, on grading and June 3 on concreting. F. B. Oren, President, was in charge for the contractor with William Busenhardt as Superintendent. Fred W. Moore was Resident Engineer for the Illinois Division of Highways, of which Frank T. Sheets is Chief Engineer.

## Observations of Construction in Europe

By A. L. H. Street



TRAVELING from New York to Leipzig, Germany, over a route seldom taken by Americans, I have been very much interested in discovering that I unwittingly chose an itinerary that was calculated to enable one to see European states progressing from the primitive to the modern. The route exhibited a state of progression in methods of construction as the journey continued from Southeastern Europe to the center of the Continent. Strangely enough, in other respects the Southeast is, in spots at least, quite as progressive as any section in the world. For example, there is electric railroad communication between Athens and Piraeus, Greece, that makes the subway trains of New York look like second-hand coffins. And yet building operations are carried on under slow and ancient methods.

#### WORK IN GREECE

The contractor or his employees may ride in busses

in Athens and Constantinople which are of a more up-to-date type than are commonly seen in Chicago and many other American cities. And yet they still rip timbers in the slow and laborious fashion that Diogenes must have noted while he was browsing around Athens looking for an honest man.

#### CONDITIONS IN BUCHAREST

They have the latest models in automobiles in these cities and in Bucharest, Sofia, Belgrade and Budapest. But women are still doing the work on building jobs that is ordinarily done by machinery in the United States.

I saw an apartment building being constructed in Bucharest. There was an up-to-date German concrete mixer at work, and also an elevator hoist, but a boy was carrying brick on his back in a hod, as shown by an accompanying illustration.

It was surprising to be told in Bucharest, a city with excellent streets and many beautiful buildings, that when a tower hoist of German manufacture was set up a few months ago on a job still in progress at

this writing, it attracted the attention of the entire citizenry, which turned out en masse to see it.

But in one phase of construction, I find no substantial difference in the various cities I have visited thus far. No up-to-date, economical, easily movable scaffolding is used in any of the cities I have seen.

In Bucharest, I first noticed a network of poles as large as telephone poles, with cross-pieces for platforms at each story of the building under construction, and a maze of braces. In Budapest, Vienna and other cities, there was to be seen scaffolding of similar form, but usually utilizing more slender supports. In these cities it is common to see scaffold platforms resting on uprights constructed along the lines of ladders—sometimes of iron, but usually of wood. Slots and holes in the uprights permit adjustments in height of the platforms.

#### FORD HOUSES AS WELL AS TRANSPORTS

The most novel thing I have noticed in the European

construction field was a cottage in Salonica, Greece, being built out of Ford automobile shipping cases. An accompanying illustration shows how two cases laid one on top of the other furnished the desired height of the modest home.

#### The 1929 Amendments to New York State Lien Law

THE 1929 Amendments to the New York State Lien Law is the title of a recent booklet prepared by Eidlitz & Hulse and published by the New York Building Congress. This little book was prepared in order to promote a better understanding of the lien laws of the building industry in New York State and analyzes all the amendments made during the last Legislature which will become effective October 1, 1929. The subjects covered are priority among lienors on private work, preservation of the proceeds of a building loan, a building loan contract defined, filing loan, contracts, priority of liens for public improvements and others.

Copies of this booklet may be secured gratis by writing to the New York Building Congress, 101 Park Avenue, New York, and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



#### INTERESTING VIEWS OF METHODS AND EQUIPMENT USED IN THE BALKAN STATES

1. The usual method of ripping timbers in Greece and other Southeastern European countries. Slow as the method is the work is skillfully done. Photo taken in Piraeus, Greece. 2. Building a house out of Ford shipping cases in Salonica, Greece. Lumber is very scarce in that country. 3. Carrying brick on a building job in Bucharest, Roumania. 4. General appearance of scaffolding on building jobs in Europe. 5. A German hoist in operation in Prague, Czechoslovakia. 6. Scaffolding on the Parthenon at Athens now being restored



# Dredging Operations on Large Land Development

*Dredge Proves Effective After Slackline Cableway Fails;  
Sand and Muck Cast On Shore Graded Back  
By High Pressure Fire Pump*



N area of 700 acres on the shores of Paw Paw Lake between Watervliet and Coloma, Mich., on Michigan-U. S. Route 12, is being developed for a summer colony through the dredging of large swamps and bogs to create canals and turning basins for small power boats.

Work on this project was started late in the fall of 1928 with a slackline scraper under contract to remove the masses of roots and muck in the sections mapped for the canals. This outfit quit work after three weeks, due primarily to the fact that the equip-

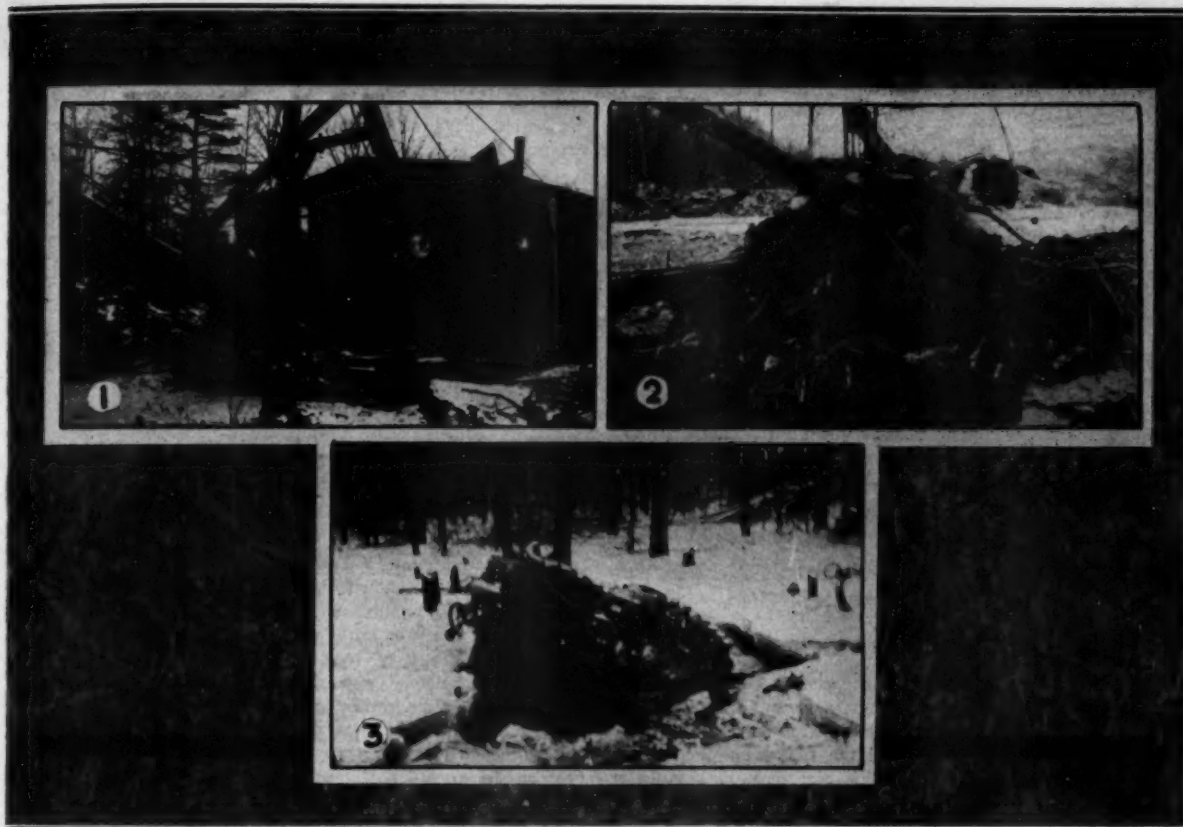
ment chosen by the contractor was not sufficiently heavy to do the work.

The slackline outfit was replaced by a dredge owned and operated by Milburn, Gresso & Cox, dredging contractors of Charlotte, Mich. Several trucks appeared at the site of the work and dumped a miscellaneous assortment of barge sections and other equipment on the frozen ground. The assembly crew quickly gathered the steel sections of barges and with canvas gaskets bolted the barge together on land and then skidded it onto the ice. Soon the diesel engine for operating the hoist was installed and the dredge was ready to start. By this time, however, the ice on the lake was between 15 and 18 inches thick and the barge could not get through the ice to float and start work. A



**KNOCKING THE TOP OFF THE SPOIL PILE AND DREDGING BY HAND**

1. Fire engine of ancient vintage used to provide powerful stream to wash back the spoil thrown up by the diesel dredge. 2. Close-up of the hydraulic "giant" clearing the earth from a tangle of roots. 3. Where the original excavation was not deep enough for a small bridge foundation it was necessary to revert to the original drag scraper operated by two men. A scoop with a chain attached to the end, one man pushed down on the end of the handle as the other pulled the scoop forward. 4. The completed operation with the miniature load of excavated material



#### WINTER SCENES AT WIL-O-PAW, COLOMA, MICHIGAN

1. The dredge assembled on the ice ready to break through and get to work. 2. Typical material taken out by the dredge and cast up on the bank to be washed clear of the muck by the hydraulic equipment. 3. When the tractor went through the ice it landed upside down and the operator escaped by a narrow margin. The lake level had been drawn down and the ice had bridged the space when the tractor broke through while it was pulling stumps.

considerable quantity of dynamite was used to try to break up the ice sufficiently so that the barge could float in the waters of the lake.

The dredge powered with a Primm diesel engine used about 350 to 500 gallons of crude oil a week. It has been operated 24 hours a day with a crew of an operator and a helper for each 12-hour shift. During the spring when the dredge was operating in a section which could be reached only by boat the fuel for the dredge was delivered in a novel manner. The 50-gallon drums of fuel oil were thrown into the lake or channel at the nearest point where they could be hauled and then pushed out by the helper in a row boat. A small derrick at the back of the dredge was used to hoist the drums onto the deck.

The dredge was supported by three spuds which went as deep as 20 feet into the muck in some places. The  $\frac{3}{4}$ -yard bucket was caught in roots and snags in the muck so frequently so that the barge was tipped dangerously. No accidents were recorded. For night work the dredge was lighted with a Westinghouse system unit and the 32 watt lamps had reflectors made of bright dishpans. The average depth of the dredging operations was about 7 feet and the material which was a mixture of tree trunks, roots, muck and sand was dumped onto the banks to be disposed of later in a unique manner.

#### DISPOSING OF SPOIL BANKS

A novel method of disposing of the material thrown out by the dredge was used, developed by George E. Klotter who is responsible for this real estate project. An old fire engine of the vintage of the early gasoline days was rigged up on a float of 2 x 12-inch planks with pontoons of old oil drums. This was moored to the bank of the canal and a 2½-inch hose with 1¼-inch nozzle and having 4-inch suction was attached. The pressure at the nozzle was such that it could not be operated easily by one man so a horse was rigged and the nozzle tied to it so it could be manipulated readily by one man. With this layout the mass of earth, sand and muck entangled in the roots piled on the shore was washed out while the man responsible for the operation of the engine used a pike pole to pull out the cleaned roots to dry and later to be pulled into a clearing and burned. About 100 to 250 feet of spoil was washed level in this manner per day. Where there was considerable sand the material was left at a slight slope away from the bank so that rains would complete the work started by the high pressure stream.

#### STUMP PULLING IN WINTER

During the winter when the ice would hold a tractor considerable work was done in pulling stumps along the shore line. After dynamiting the stump to loosen it a Cletrac tractor was attached to the stump by a

steel cable and the stump pulled clear. At one time during this work when the lake level had been drawn down and the 18-inch layer of ice remained unsupported the tractor broke through and overturned, the operator escaping by a narrow margin. This did not deter him and as soon as the tractor, which was also unharmed, was turned back to its upright position, he climbed back into the seat and started out again.

#### BRIDGE CONSTRUCTION

The development calls for five bridges to connect various of the islands with each other and to the mainland. These were let by contract to the Beach Manufacturing Co., of Charlotte, Mich. The bridges of I-beam construction were delivered and assembled by a very small crew. The accompanying illustration shows a 2-man piece of construction equipment which could not well be replaced by any modern power operated machine. A scoop with a chain and rope attached was used with one man pressing it into the sticky mud and the other pulling the scoop forward. This was necessary to remove excess mud for the foundation of one end of the structure.

#### Our Front Cover

THE group of buildings on the cover of this issue are three of the largest buildings in New York City. The Chrysler Building, under construction and shown at the right, will be 60 stories high and the tallest building in the world. The building to the left is the recently completed Chanin Building which towers 56 stories into the air and in the background is the Lincoln Building, also under construction, which will be 53 stories when finished.

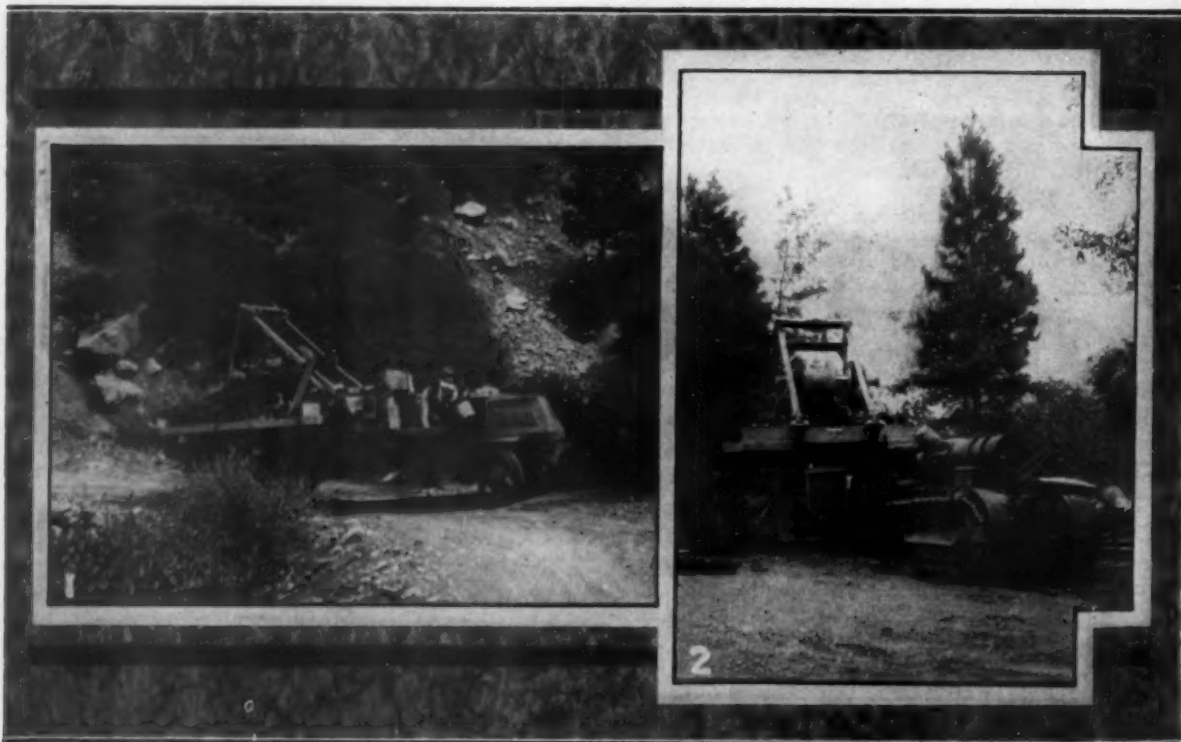
The Chrysler Building which will take from the Woolworth Building the distinction of being the world's tallest building (a record held for 16 years) tops the Woolworth Building by a comparatively few feet. The Woolworth Building is 792 feet high while the Chrysler Building will be 808 feet high.

In these days of feverish business competition, however, records do not go for long without being broken and operations are already under way for the erection of a still larger building which will exceed the Chrysler Building. This is the Bank of Manhattan Building which will be 836 feet in height, into the mountains many miles from the railroads.

## Dismantling and Assembling Methods Used when Moving Big Shovels in the West

VERY few contractors realize that efficient methods can be applied to the movement of large road building machines from railroad cars to the point where the machines are to be used. Two widely different methods have been used in the West where considerable equipment is moved.

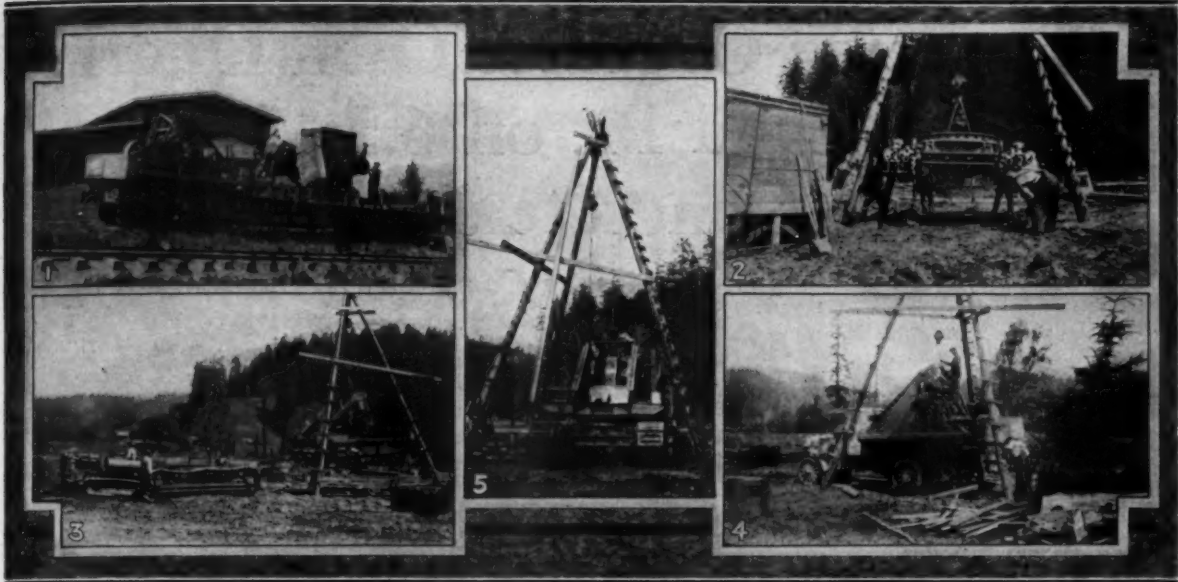
The first two pictures show how a Koehring shovel was moved from the Western Pacific Railroad at Blairsden, California to Sierra City, over a very narrow steep road. At Blairsden, the shovel was completely dismantled into pieces small enough to be carried on motor trucks as shown and at Sierra City the shovel was reassembled. In reassembling the shovel the rotating structure was mounted on a timber support as shown and a Caterpillar tractor snaked the crawling base under the rotating structure, which was then lowered down onto the base. Later the engine and shovel and other parts were assembled.



HAULING AND ASSEMBLING A KOEHRING SHOVEL

1. Truck hauling the pieces of the dismantled shovel.
2. Platform and drum of the shovel held up by the timber support ready for the crawlers to be pulled under for assembly





**METHOD OF MOVING A NORTHWEST SHOVEL FROM GRANTS PASS TO REQUA AND ASSEMBLING IT FOR SERVICE THERE**

1. The shovel as shipped completely dismantled into pieces small enough to be handled readily by four motor trucks. 2. Derrick of local cut logs holding base ready for the crawlers to be run under and attached. 3. Base with crawlers snaked out from under the derrick while top or rotating section of the shovel was lifted from the next truck as shown in 4. The central illustration, 5, shows the rotating structure lowered onto the base and ready for the engine to be installed.

A much different method was employed in moving a Northwest shovel from the railroad cars at Grants Pass to Requa, a distance of 100 miles. The shovel was shipped dismantled in pieces small enough to be carried by four motor trucks. The pieces were loaded onto the four trucks by skidding, the loading operation being completed in fifteen hours.

At the point where the shovel was to be erected a derrick was erected from trees cut in the vicinity, as illustrated. The first truck to be unloaded was the one carrying the crawler base. This was done by driving the truck under the derrick and connecting cables to the base. The cables were operated by a six-wheel truck, which when driven from the derrick raised the base clear of the truck. The freight truck was then driven away and the base lowered. The crawler tracks were installed and the crawler base snaked from under the derrick by a Caterpillar tractor. The truck carrying the rotating structure was then driven under the derrick and the rotating structure picked up by the cables and raised clear of the truck, which was driven away, and then crawling base snaked back

under the rotating structure which was lowered down onto the crawler base. The engine was then installed and later the other parts. The reassembling was completed in a total of 22 hours.

### Bids on Levee Work Increase Slightly

At the letting in the Third District at Vicksburg on July 22 the usual low prices on dredging work on the new B-section levees were increased somewhat showing an appreciation on the part of the contractors that the low cost of placing dirt by dredging does not make up the entire cost of levee building. The use of the draglines and in some cases teams to help out cuts the profits materially. The letting was notable also for the number of new contractors attracted by the large contracts offered.

The tabulation of bids below is furnished through the courtesy of the Memphis office of the Harnischfeger Sales Corp., which has a fine service for those attending the letting in furnishing a tabulation soon after the bids are read.

#### BID TABULATION SHEET

District: 3rd

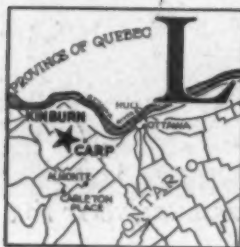
Date: July 22, 1929

Place: Vicksburg, Miss.

Bidders	Item No. 1. Below Cahoon Bolivar Co. 1,395,000 Cu. Yds.	Item No. 2. Round Lake. 1,300,000 Cu. Yds.	Item No. 3. Hurricane Point. 1,672,000 Cu. Yds.	Item No. 4. Below Gaisah. 1,731,000 Cu. Yds.	Item No. 5. Above Rosedale. 1,433,000 Cu. Yds.	Item No. 7. Above Benlah. 698,000 Cu. Yds.	Item No. 8. Benlah to Lake Vermilion. 2,400,000 Cu. Yds.	Item No. 9. Bolivar Bend. 1,328,000 Cu. Yds.	Item No. 10. Buck Ridge. 725,000 Cu. Yds.	Item No. 11. Estaw to Mounds Ldg. 810,000 Cu. Yds.	Item No. 12. Black Bayou. 697,000 Cu. Yds.
Government Bid.....	2219	3440	2168	2773	2837	3775	3645	2693	3024	1623	2319
Orleans Dredge Co., New Orleans.....	40	40			399		4247	4138	295		
McWilliams Dredge Co., New Orleans.....								3104	346		
Canal Construction Co., Memphis.....	278	348						3160			
H. B. Blanks, Tallulah, La.....	306	43	2652	3220		2652					
Rodgers, Jones & Uzell, Memphis.....	348	368									
Sternberg Co., Inc., St. Louis.....	28	36	28	35				31			
Atlantic, Gulf & Pacific Co., New York.....						4097	4787	3789			
T. W. Roach, Memphis.....	286	52	2930	43	3030			2789	2539		43
S. K. Jones Construction Co., Memphis.....	289		2960			2785		2620			
Lawrence Bros. Co., Driver, Ark.....			2788	2990	2987	3085		268			3240
E. F. Powers Const. Co., West Palm Beach.....	281										
Wilbanks & Pierce, Rosedale, Miss.....	3139	3139	3139	3139							
4 Delta Const. Co., Fayette, Miss. (R. T. Clark Co., J. W. Noble).....	2897	3007	2997	3609		3490		2907			
C. F. Lytle, Sioux City, Iowa.....	248		2725					32			
W. T. Lawrence & Brown-Dennison Co., Memphis.....	3398		3240			3130		2980			
W. G. Summerville, Jr. & Co., Memphis.....						2447					
Aderholdt, Weathers & Wooten.....	2850	3497	3070	4444		294		294	2880		41

# Contractor Operates Own Quarry and Sand Pit on 6.5-Mile Concrete Job

*Curran & Briggs, Ltd., Have Complete Organization and Well-Planned Equipment Layout on Work at Carp, Ontario*



LACK of commercial pits within economical hauling distances and the failure of the gravel pit which it had expected to use as a source of supply of both sand and gravel led Curran & Briggs, Ltd., to purchase property about  $\frac{1}{2}$ -mile from the northerly quarter point of the job and open up a ledge of good limestone. A complete sand-washing outfit was also installed for this particular job about a mile south of the easterly end of the job.

## GRADING OPERATIONS

The only grading necessary on this project was at points where the rather sharp curves of the old road were reduced to about 8 degrees necessitating fill for the new sections and the widening of the standard 20-foot road to 23 feet. This work was all handled by teams and slip scrapers, about 10 teams being used with 6 laborers loading scrapers.

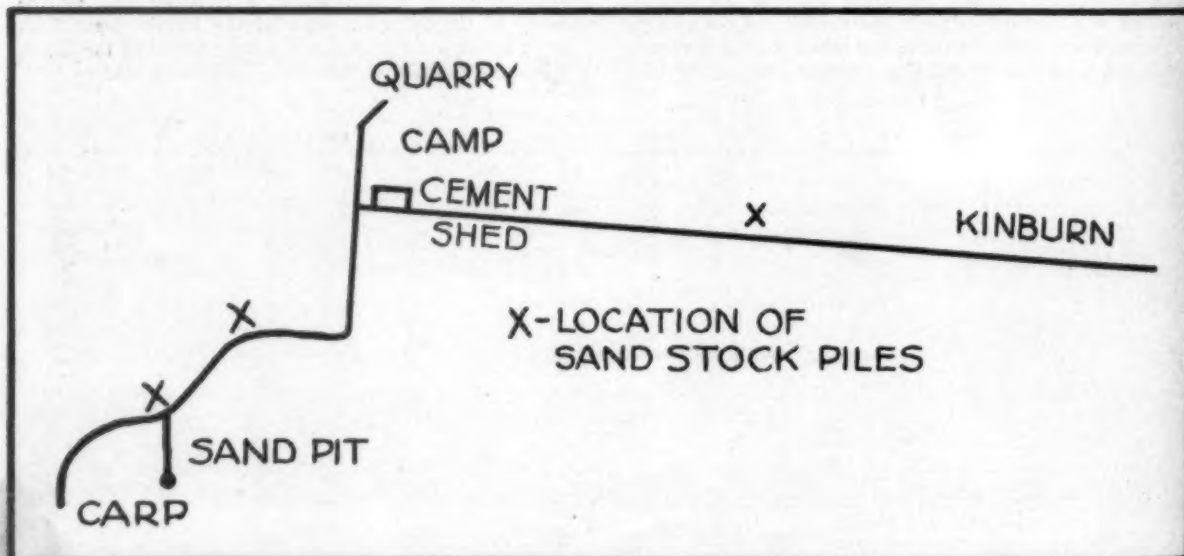
## STONE QUARRY

As will be noted on the schematic sketch the quarry is located about 1 mile off the line of the road being rebuilt and at a point about  $4\frac{3}{4}$  miles from the north

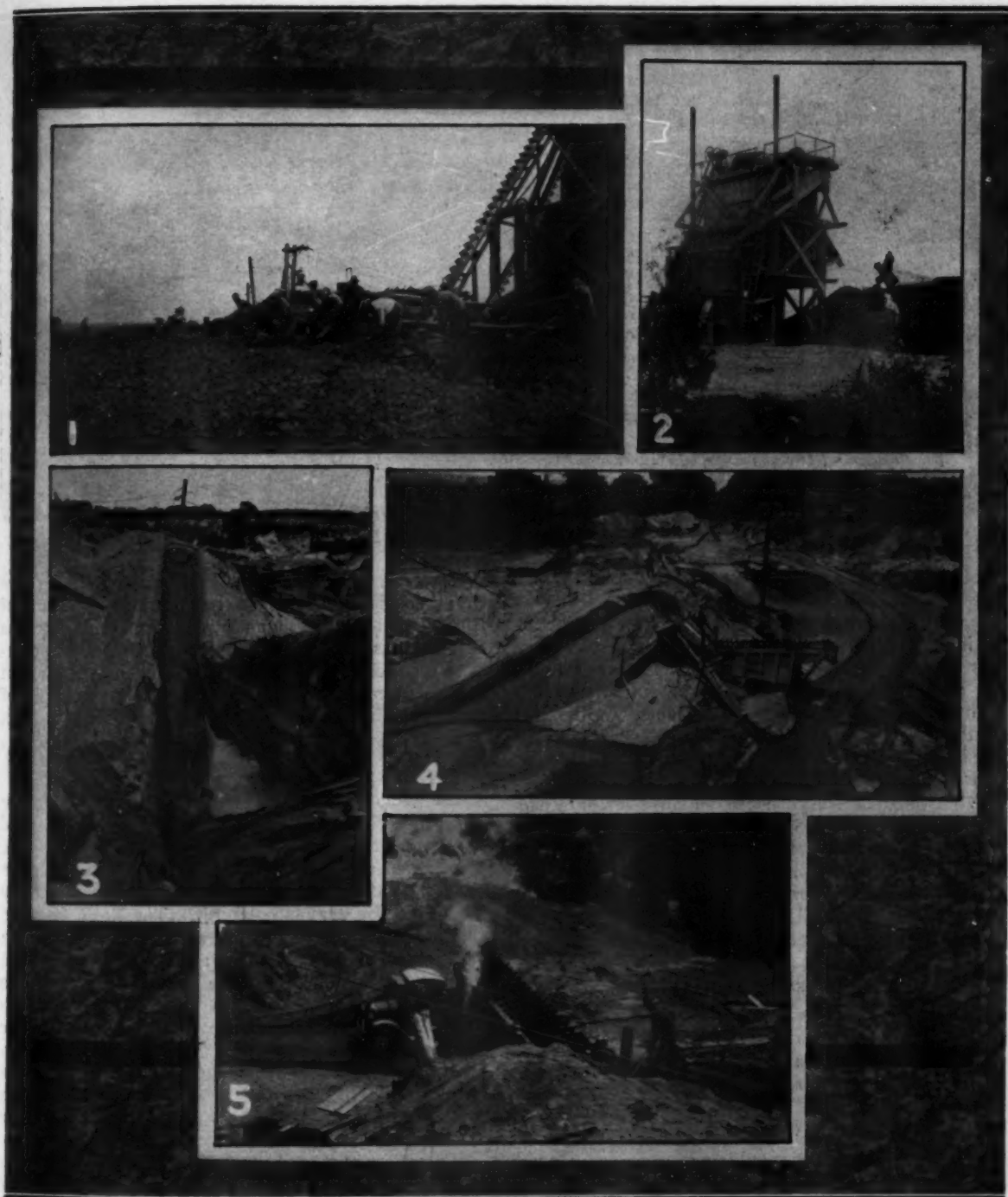
end of the 6.5-mile job. On the road to the quarry the contractor maintains a camp for the 125 men on the job about 75 of whom are fed there.

The contract was awarded to Curran & Briggs early in February, 1929, and equipment was moved on the job in April although it was impossible to begin grading operations until June 15, 1929. In the meantime the quarry was prepared for operation, equipment set up and a reserve stock pile started.

The face of the quarry is about 150 feet long and was cut to a maximum depth of about 20 feet working back from the crusher site and maintaining a good floor for the two White trucks which were used to haul stone from the face to the crusher. A Sullivan-360 compressor operated by a 50-horsepower Crocker-Wheeler motor maintained about 80 pounds of air on the line for the three Sullivan jackhammers which were used for drilling the face. The rock shattered well and was easily loaded by a Lorain 1-yard shovel. The trucks hauled the rock a distance of about 300 feet to the platform in front of a conveyor belt onto which 10 men forked the rock, sledging such stone as was too large to handle easily with the stone forks. In this way there was a continuous stream of stone being fed to the No. 4 McCully gyratory crusher instead of the intermittent load which it would have had to handle if the truck loads had been dumped



*Schematic Diagram of Operation and Plant Location on the New Carp-Kinburn Road.*



#### SAND AND STONE OPERATIONS OF CURRAN & BRIGGS AT CARP, ONTARIO

1. Laborers shoveling stone from the dumping apron to the belt conveyor which carried it to the crusher. 2. The screening plant with the oversize bin at the left and the Lorain shovel at the right. 3. The Sauerman scraper delivering sand to the sheet iron apron of the washing plant. 4. View of the washing operations showing the scraper delivering a load, the sluice carrying the sand to the washer and the Champion washer. 5. Truck loading direct from the sand washer. The man in the foreground is tending the sluice

directly into a pit leading to the crusher. There was no auxiliary crusher or standby so that this method was in the nature of a protection for the crusher. The crusher has operated continuously since the work started with a 10-hour day shift and a night force also. A power line runs into the quarry to furnish

power for the compressor motor as well as the 75-horsepower motor which operates the crusher and for lighting for the night shift.

All stone crushed in the day shift is run by gravity to a bin with a Blaw-Knox batcher. The stone on the night shift is run to the other side of the Dominion





*The New 1929 Koehring Paver Used by Curran & Briggs at Carp, Ontario*

Good Roads elevator and screen, thus forming a stockpile from which stone could be loaded to the batcher bin when needed in excess of the crusher production or in case of breakdown. The Lorain shovel-crane was used for this work. The area under the batcher bin was paved with concrete to prevent any trouble with miring of the trucks in continued wet weather as there was formerly a swamp at this point. The crusher produced about 325 tons of stone in the 10-hour day shift and about 175 tons at night. A fleet of 20 two-batch trucks consisting of 13 Hug Road-builders, 4 Macks and 3 Stewarts handled the stone from the quarry in batches.

At the crushing plant the operating force consisted of 1 man at the crusher, 1 shovel operator, 2 truckmen and 2 men on the drills in addition to the 10 laborers shoveling to the crusher.

#### CEMENT HANDLING

Canada cement was received by rail at a point 4 miles away from the road leading to the quarry and was hauled to the quarry road by two GMC trucks. At the junction of the roads was a cement shed capable of holding about half a carload of cement. When the need for cement equaled the supply the cement

trucks pulled up alongside the shed and the 8 bags were loaded directly on the batch truck by means of two wooden-bottom dump buckets run out over the batch trucks on monorails. When there was an over-supply of cement it was stocked in the shed or on the platform, and when there was an under-supply of cement the batch trucks loaded direct from the cement house or platform.

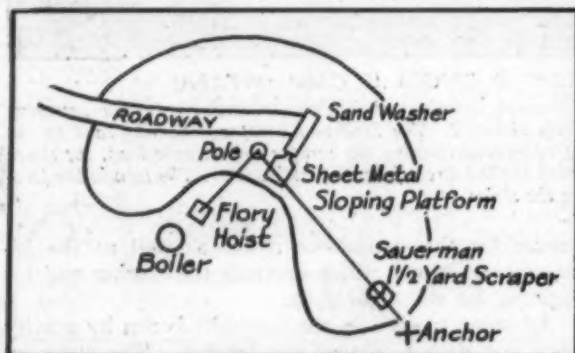
#### SAND PIT

The sand pit which was to have been the source of both coarse and fine aggregate for the job is located on the detour near the south end of the job. The layout was about as shown in the diagram with the boiler and the Flory 9 x 12 steam hoist on the center mound of the semi-circular pit. The hoist operated the Sauerman 1½-yard scraper through sheaves at a right angle which was varied as the pit was extended until the scraper was operating behind the hoist. The full load of sand was hauled up a sheet iron ramp and from there washed down by a stream of water from a 2-inch pipe into the Champion sand washer. This consisted of a box about 20 feet long with a rising floor and a flight of scrapers which pushed the sand up the washer as the dirty water flowed over the scrapers and out a pipe at the lower end.

Water for the sand washer was supplied from a creek about 800 feet away by a 8 x 6-inch centrifugal pump made by Smart-Turner Co., Hamilton, Ont., and run by a Hinckley motor speeded up with special gearing. Water was delivered to a 6-inch wrought iron pipe with Dresser couplings which at the end of about 100 feet was reduced to two 2-inch pipes.

Five trucks were used to haul the sand an average of 2 miles to stock piles located at three stations along the job. Five men were employed in the sand pit: a foreman, a pump operator, a hoist man, a fireman, and a feeder for the sand sluice.

From the stockpiles the sand was loaded into a 15-yard wooden bin with a Blaw-Knox batcher by a Byers Bear Cat crane with a ½-yard Williams clam-



*Plant Layout for the Curran & Briggs Job*

shell, from which the batch trucks which already had their stone and cement received the proper amount of sand for the 1:1½:3 concrete. When it came time to move the bin it was hauled on its own skids by a truck.

#### FINE GRADING

All fill was spread in 6-inch layers and compacted with a Waterous 12-ton steam roller. The fine grading gang consisted of a roller man, one man on the Hadfield-Penfield grader, 4 form men, a catch team to bring up from lumber and pins, a team and driver with a slip scraper, and 12 shovel men. Forms were of 2 x 10-inch lumber held in place by 2½-foot iron pins. These pins are made by buying ¾-inch reinforcing steel cut in 5-foot lengths and then having these cut in halves on the bias to provide a driving point.

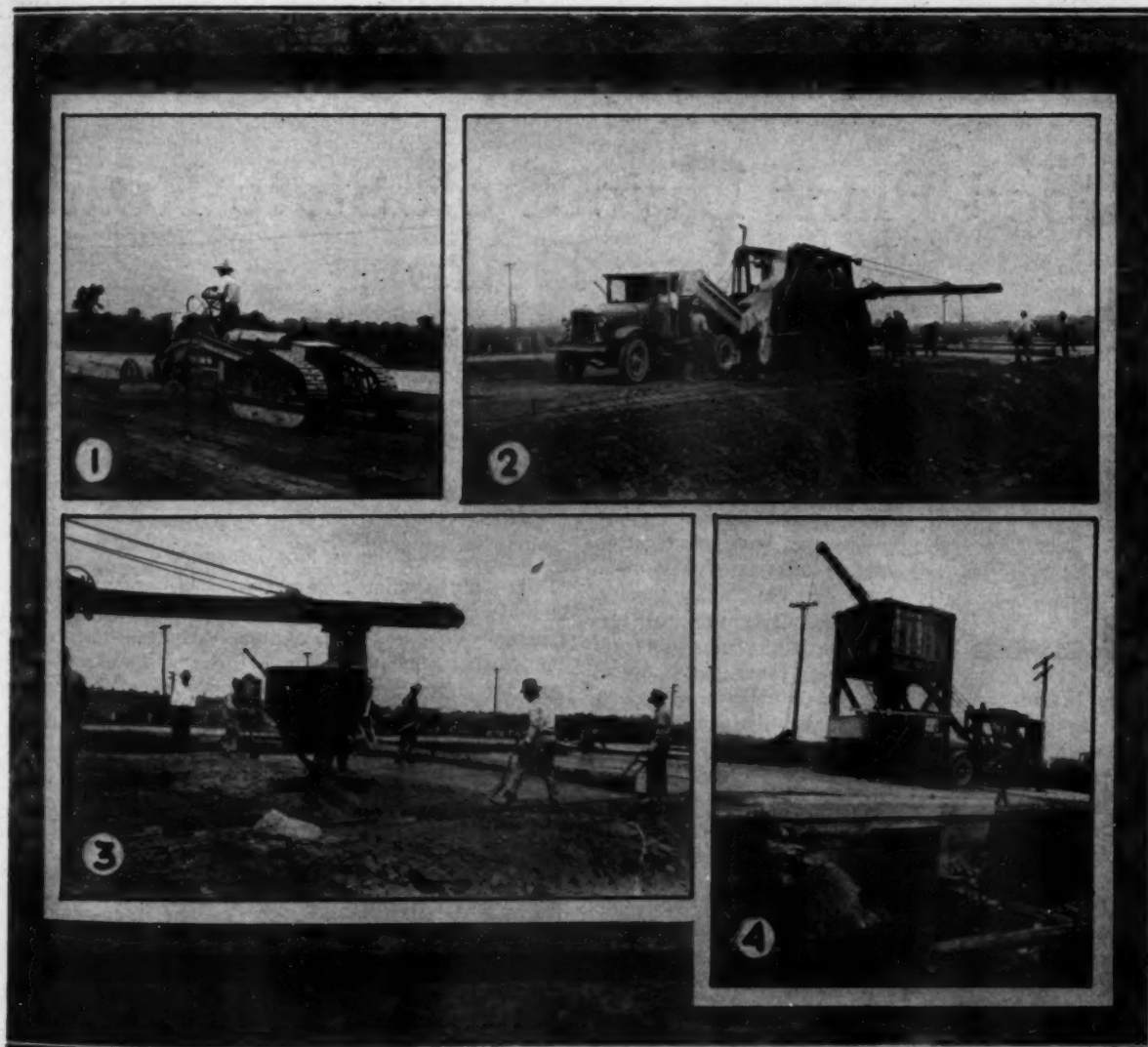
#### WATER SUPPLY

All water for the paver and for sprinkling the sub-

grade and for curing was supplied from the extreme south end of the job by a C. H. & E. No. 11 pump which maintained a pressure of 60 pounds at the paver throughout the work. The water line was of 2-inch pipe with hose connections every 200 feet. The small hose for sprinkling the subgrade was attached to the opposite side of the 1929 Koehring 27-E paver from the regular hose connection for the water for the batches.

#### CONCRETING ORGANIZATION

The concrete crew was quite uniform in laying 1,000 feet of 20-foot, 10-7-10 pavement a day. This footage was somewhat reduced when paving the widened curves. The pavement was not reinforced except at fills and at places known to be weak. The subgrade was rolled with a 12-ton roller ahead of the paver and maintained in first class condition by two men who shoveled the grade clear of any damage by the batch trucks.



#### GRADING AND PAVING OPERATIONS ON THE CURRAN & BRIGGS WORK AT CARP, ONTARIO

1. The H-P power grader on fine grade work. 2. Hug truck delivering a batch to the 1929 Koehring paver. 3. Bucket delivering concrete to the grade. Hand screed shown in the background. 4. The sand batcher plant. Sand was delivered to the slope behind the bin by truck and picked up by the Byers Bear Cat crane and batched and dumped into the Hug trucks to be hauled to the paver.

The concreting crew consisted of the mixer operator, 2 men who worked at the Blaw Knox turntable which was used on all straight-away work, 1 man to dump trucks at the skip, 2 men on fine grade as mentioned above, 2 men on each side of the center strip shoveling concrete, 2 men who set the center strip and laid the Clinton 6-inch welded mesh reinforcing on the ground before the concrete was spread on fill and who sprinkled the grade ahead of the paver, 2 men on the heavy screed, 2 finishers who rolled fresh concrete 5 times with the iron roller, as well as belted it with the basswood strip and finally with the regular canvas belt and then finished the edges. There were no expansion joints used other than the center strip. Four men were used pulling stakes and forms and covering the concrete with earth from the shoulder as soon as it had set. One man sprinkled the earth for a period of 6 days. The earth was removed in 14 days and the pavement opened to traffic in 21 days.

#### DRAINAGE

The contract called for three reinforced concrete box culverts of 1:2:4 concrete in the footings and 1:1½:3 concrete in the structure. The culverts measured 4 x 4, 5 x 4, and 8 x 4 feet and were all 50 feet long.

Instead of the old type of drainage using field tile laid herringbone style every 25 feet, each section 25 feet long and at an angle of 45 degrees with the center line of the road, a new and more effective method was used which actually saved tile, was easier to install and was better theoretically and practically in draining the subgrade. Three lines of 6-inch field tile were laid in the road, one down the center, and a line at each edge of the pavement. With this the tile had only to drain 5 feet on either side of the line instead of 12½ feet with the old method of laying. All tile was covered with tar paper at the joints and covered throughout with 12 inches of crushed stone.

#### PERSONNEL

The firm of Curran & Briggs, Ltd., consists of Robert Curran, President, F. T. Briggs, Vice-President and General Manager and J. K. Curran, Secretary and Treasurer, with offices in Toronto, Ont. This contract was let by the Ontario Department of Public Highways of which A. A. Smith is Chief Engineer. For the Department John Sears is District Engineer, P. Keenan, Resident Engineer, and B. Tett, Inspector. Duncan F. Dewar was Superintendent for the contractor.

## Good Plant Layout on State Road Job Near Detroit

*Well-Known Wayne County Road Commission Successful Bidder on 19.7-Mile Concrete Widening Project Using Both Industrial and Truck Haulage*



WAYNE COUNTY, Mich., was the first governmental unit to build concrete roads in the United States. For many years the mention of concrete roads was synonymous with this Michigan county. This county's highway organization was in operation building roads for several

years before the Michigan State Highway Department was provided with funds by bond issue to carry on this work. Having developed a large and efficient organization for the construction of its own concrete roads, the county has also for the last few years sought contracts from the State Highway Department for the construction of State projects within the county. This article is not written to discuss the merits of government versus contract construction, but will show some of the methods employed that are worth the attention of contractors.

#### THE CONTRACT

The contract for the construction of 19.6 miles of 10-foot widening of the existing concrete pavement on Telegraph Road, west of Detroit and between Michigan Route 17 and Grand River Avenue, was awarded to the Wayne County Road Commission for \$361,270.41, to include grading and drainage structures and

10-foot paving on the east side at present. In addition the County was successful bidder on two adjoining jobs which could be effectively and economically handled from the same plant set-up.

#### GRADING NOT DIFFICULT

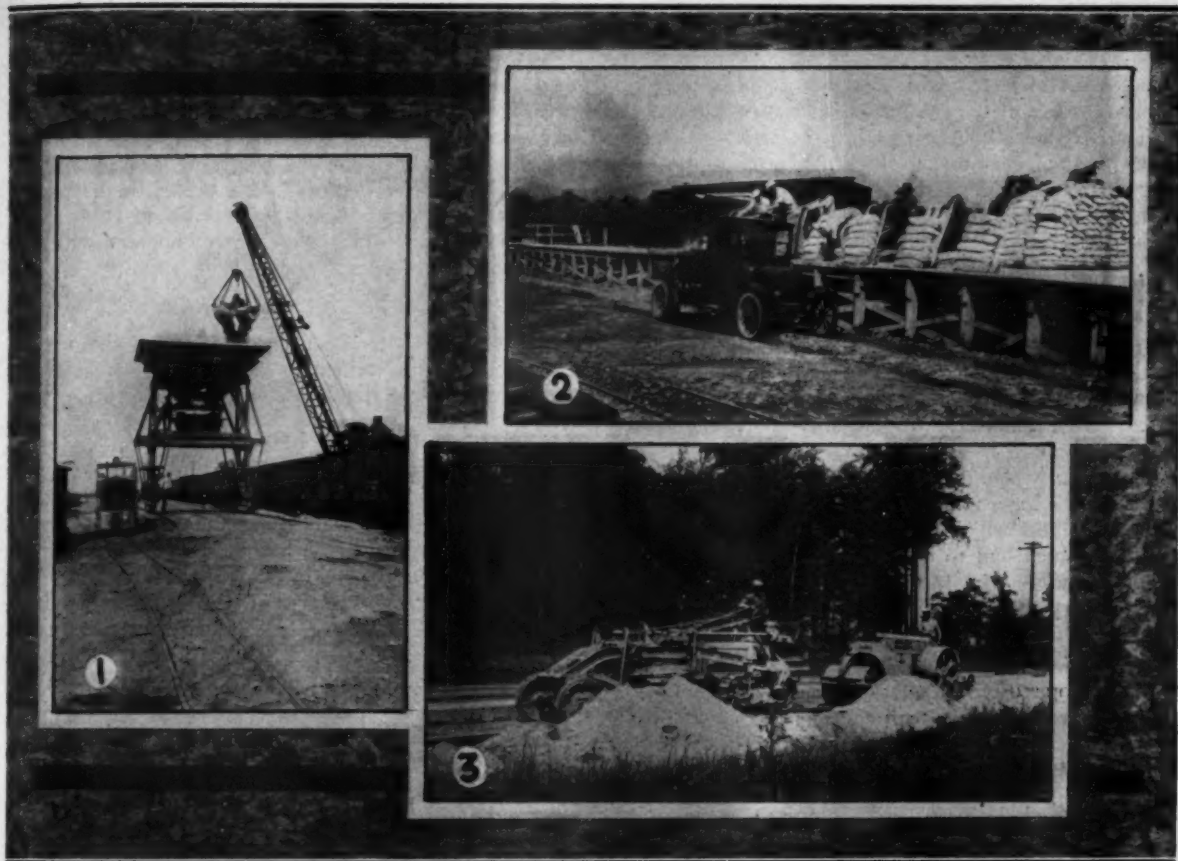
The only grading required was the removal of the shoulder which was done with two Bucyrus-Erie machines equipped with skimmer scoops. There was in addition a small amount of fill which was handled with the larger shovel and several of the County trucks.



#### SCHEME FOR HANDLING TRUCKS AT THE PAVER

In foreground, the mule and horse hitch which pulled the platform used by the trucks along ahead of the Rex paver. Truck is shown on platform dumping batch into the skip of the paver





#### OPERATIONS ON THE TELEGRAPH ROAD PROJECT NEAR DETROIT

1. Browning crane unloading from cars to the Blaw Knox batcher plant mounted on a gantry and pulled by a Plymouth gasoline locomotive. 2. A small storage pile of cement with the hand trucks loaded ready to be tipped onto the batch trucks as they pass. 3. Russell motor patrol grader and Huber gas roller, a part of the grading equipment

As the soil is sandy in this section little work was needed to put the fine grade in shape for the concreting. A Russell motor patrol grader shaped up the section and it was rolled with a 10-ton Huber gas roller.

#### UNLOADING AND BATCHING PLANT

The plant for batching was laid out in a very effective manner so that the industrial railway equipment or trucks, both of which were used on the work, could load most expeditiously. An 11-car spur track was used to spot the cars of sand and stone. Both sand and gravel came from Green Oak, Mich., by rail a distance of about 100 miles. Cement was also received by rail from Petoskey, Mich., a distance of 300 miles. The cement cars were spotted on the same track as the sand and gravel but about 300 feet from the batching plant. All aggregates were received on gondola cars and were unloaded by a Browning locomotive crane with a 40-foot boom and an Owen  $\frac{3}{4}$ -yard clamshell bucket. The sand and gravel were unloaded direct to the Blaw Knox batcher plant or to stockpiles.

The batching plant was mounted on two rails about 15 feet apart and was moved along to be as near the crane as possible as the railway cars were rolled in and remained stationary. The batchers were equipped with weighing beams to give the proper proportions for the

mix, which is proportioned by weight and which depends on the weight of the coarse aggregate. The mix corresponds very closely to a 1:2:3½ mix.

For the northern section of the job, the plant being located about 3 miles from the north end of the major contract, industrial railway equipment was used, then for the section immediately south of the plant, trucking was used because it was impossible to run the industrial track across the Michigan Central main line tracks. On the remaining portion the industrial tracks were moved in and used with trucks holding two batches delivering to the industrial cars.

Industrial equipment included 5 Plymouth gasoline locomotives and 80 Lakewood cars with 2 batch boxes each. These were run in trains of 20 cars per locomotive. An industrial 24-inch gage track ran down between the batcher plant rails for the trains and on either side of the industrial track was a plank runway for the trucks to use when they were handling the batches. The batcher plant was moved along to enable the crane to serve it, with a gasoline locomotive running on another track laid on the far side from the full-gage track. Coal for the locomotive crane and the water connection for it were at the head of the track toward the cement platform.

When the train or trucks had received their loads of proportioned aggregate they moved forward to the

cement platform which was not provided with a shed, for in case of inclement weather the piles of cement bags were covered with heavy tarpaulin. The bags for the 6-bag batch were loaded on hand trucks and lined up along the edge of the platform. Five men handled the cement, piling it on the trucks and working in pairs, throwing the bags onto the trucks or emptying the bags into the cement compartments of the batch boxes. One man was used to bale the bags as thrown from the platform or returned from the paver.

The crew in the yard consisted of the crane operator and firemen, locomotive engineer for moving the batcher plant, one man weighing and another dumping the batches, 3 men on the cars cleaning up, 5 men on cement and 1 baling. There was also a blacksmith with a small forge to handle temporary repairs. All major repairs were sent to the County shop in Wayne not far distant.

The County has its own track gang which has been at this work for a number of years, and a pipe gang as well as a crew which did nothing but handle the 300 lanterns which had to be set out each night along the extended job. The strip was barricaded with half-horses every 15 feet.

#### PAVING

Paving operations were standardized and there were several novel features worth considering. At the paver the trucks came down on the completed strip and backed to the paver skip over a 9 x 15-foot platform with a triangular piece set at the front as a precaution to prevent the trucks cutting short and dropping onto the subgrade. The platform was hauled by a team.

A board running on the forms was used to check the subgrade immediately behind the paver. The crew for paving consisted of: 1 man to handle the mules, 1 man on hose and checking the hired trucks as they delivered the batches, 1 man dumping the trucks, and shoveling at the skip, the paver operator, 3 men shoveling concrete, 2 men on the Lakewood finisher, one of them attending to the machine and shoveling when nec-

essary and the other only shoveling, 2 hand finishers, and 1 man who constantly checked the finished surface with a 10-foot straight-edge. There were 2 men who spread the burlap over the finished pavement and sprinkled it. Eleven men who made up the track gang were used to spread the earth over the pavement on the day following pouring, and 2 men were used to sprinkle the earth cover for the full 7 days before the cover was removed and the pavement was opened to traffic. On the grading gang there were three laborers with the grader and roller operators.

#### SPEED OF OPERATION

The County forces on this job averaged about 1,300 feet of the 10-foot widening strips and 847 feet of 20-foot paving where that work was in progress.

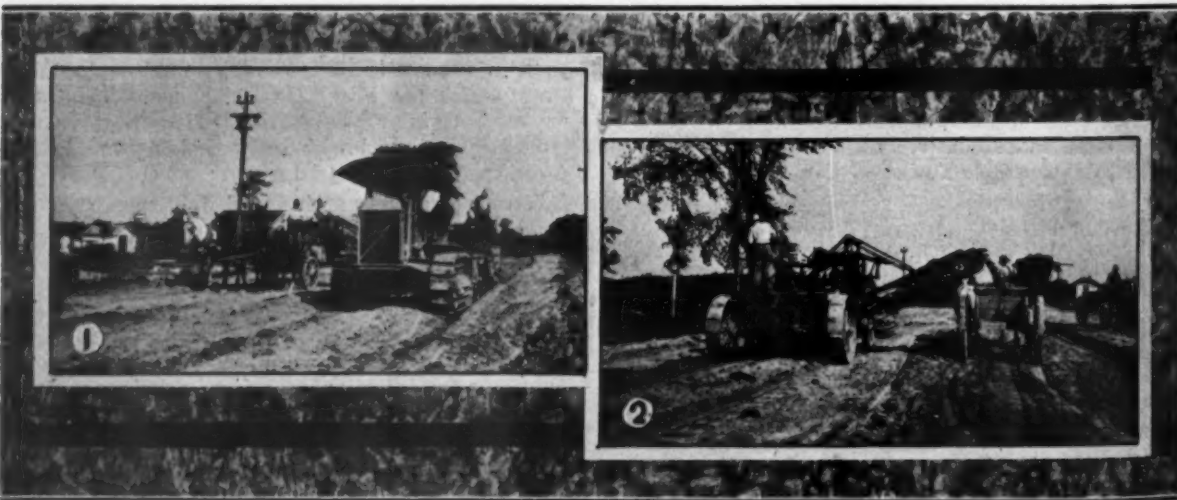
#### PERSONNEL

The contract was awarded to the Wayne County Road Commission for which Charles Lyons was General Superintendent, Paul Wing and Edward Chappel, Paving Inspectors for the State Highway Department and D. L. Cartwright, Material Superintendent. The work was under the direction of W. W. Lavers, Division Engineer, and C. L. Cowgill, Resident Construction Engineer, Roy C. Bailey and Horace Tinkar, Plant Engineer, Roy C. Bailey and Horace Tihkar, Plant Inspectors.

#### Next Convention of American Institute of Steel Construction

**A** MERICAN Institute of Steel Construction, Inc., will hold its next annual convention in Biloxi, Miss., from November 13-16, 1929. An international conference on steel construction has also been announced and will be held at Liege in August, 1930. This conference has been called in conjunction with an exposition on steel and has been arranged under the auspices of the Belgian Government.

The American Institute of Steel Construction has also been invited by the German Steel Syndicate to participate in a large international conference on steel construction to be held at Dusseldorf around the same date.



A COMMON METHOD OF HANDLING ALL ROUGH GRADING FOR CONCRETE PAVING IN THE MIDDLE WEST.

1. Caterpillar Sixty pulling an Austin elevating grader on Section 165 in Indiana, the work being handled by Wm. St. Clair on a subcontract. 2. A view after the outfit had turned showing the stream of earth pouring into the 3-up dump wagon

# Performance



**T**HIS picture shows one of several LaBour pumps owned by Dowdle Bros. of Chicago, Illinois. A reliable pump was needed on their sewer contract at Lombard, Illinois, and of course a LaBour was chosen for the job.

It is not enough that a pump be well built of good materials. The pump should be *designed* to give long and dependable service under the most trying conditions. LaBour pumps are designed that way. They are simple, open impeller, centrifugal pumps which are self-priming and which pump air.

Our experience in pumping problems is at your service. You will be under no obligation in writing us for information. . . . THE LABOUR COMPANY, 1601 Sterling Ave., Elkhart, Indiana, (Formerly at Chicago Heights, Illinois.)

## These Features Mean Long Service

- 1 Only one moving part.
- 2 Self-priming.
- 3 Pump air as well as water.
- 4 No close clearances.
- 5 No float or check valves.
- 6 No bearings adjacent to liquid.
- 7 No diaphragms.
- 8 Large capacity.
- 9 Economical to operate.



# LA BOUR PUMPS

NEVER LAY DOWN ON THE JOB



# Well Point Drainage Used in Clay Territory

*A 25-Foot Layer of Impervious Clay at Jacksonville, Ill., Underlaid with Sand Makes It Possible to Eliminate All Sheet piling*



LAY is the predominating soil in Illinois causing trouble in road work as well as in the well point drainage of excavations for various structures. The city of Jacksonville, Ill., this last summer built a new sewage disposal plant of the Imhoff tank-sprinkling filter type which necessitated considerable excavation, although pumping of the raw sewage made possible building above ground a larger part of the structures than usual.

The deepest structure from the standpoint of excavation was the secondary settling tank in which the mineral matter formed in the trickling filter will have an opportunity to settle out. This tank was 28 feet deep and 30 x 60 feet in plan. The other was the primary tank 18 feet deep and 55 x 56 feet in plan.

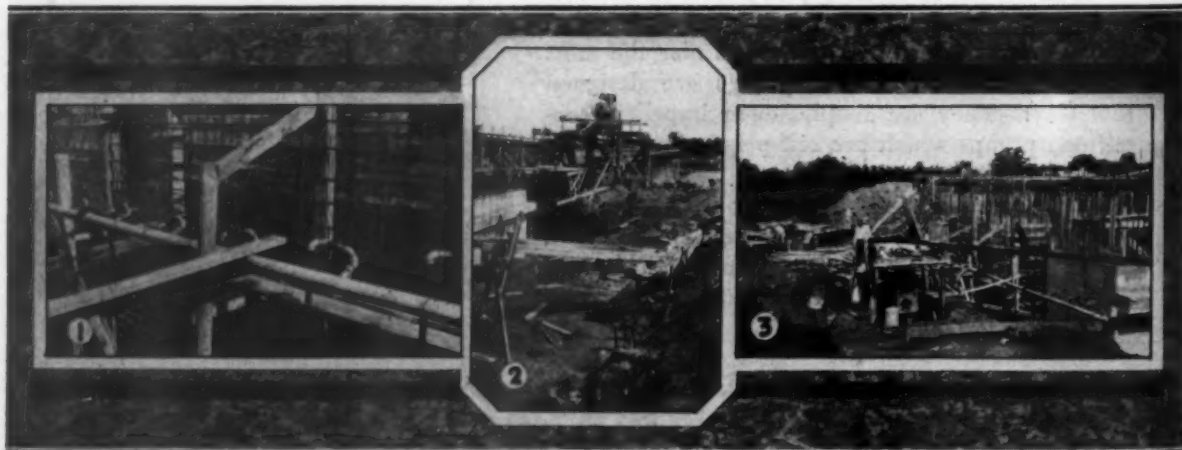
Careful examination of the area by the contractor, R. McCalman, Inc., Danville, Ill., showed that the first 21 feet of excavation would be in impervious clay, then about 4 feet of sand and blue clay. Below this, however, was practically pure sand which led the contractor to decide to try out the well point method which was entirely new to this territory. During the early excavation the conditions were bad owing to exceedingly wet weather. The clay held the water so that it was almost impossible for it to seep through to the well points. In dry weather, however, although the excavation was only 100 yards from a stream, there

was never more than an inch of water in the deepest hole. This amount of water caused no trouble whatsoever with the form work for the bottom of the tank. As soon as the concrete was poured in the floors of the tanks about 75 per cent of the well points were pulled in the 18-foot excavation and the remainder of the work was done with no trouble whatsoever.

The well points were driven about 32 inches apart, this being necessary because the clay held the water so tenaciously that a wider spacing would not have removed the water sufficiently to eliminate the use of all sheeting along the sides of the excavation. In only one or two short stretches where the clay seemed more solid, not allowing the water to seep through as in most parts of the work, was any sheeting put up and this was only light boards as precaution. The well points were on 1/4-inch casing tapped to a 4-inch header. There was a maximum of 70 points working when the excavation was the deepest.

Two Domestic pumps were used to unwater the system for a part of the time but only one was needed after the bottoms of the tanks were sealed with concrete. One of the pumps was operated from the first of February, 1929, until late in August without stopping except to change the oil and once when a change was made in the line. Both the pumps used and the entire well point system were furnished by the Domestic Engine and Pump Co.

J. D. McIntyre was Superintendent for R. McCalman, Inc., contractors. E. M. Henderson, City Engineer, was in charge of the work for the city.



CONSTRUCTION OF THE JACKSONVILLE, ILL., SEWAGE TREATMENT PLANT

1. Detail of the header for the well points used to keep the excavation dry. 2. General view of the concreting plant showing the stock piles at the right and the skip on the left below the Jaeger mixer. 3. One of the two Domestic pumps used on the well point system which is shown running along the side of the settling basin wall with some of the points disconnected as the full number was not needed after the floor of the basin was completed, sealing the entire area against seepage.

# Ransome 14-S MIXERS

**IN THE CENTRAL MIXING PLANT**  
*of the* **LARGEST CONCRETE PIPE YARD**  
**in the WORLD**



The three 14-S Ransome Mixers in the plant of the Western Concrete Pipe Co. at Southgate, California. Reinforced concrete pipe from 24" to 102" in diameter is cast at this plant.

**"After considerable investigation," writes Mr. H. H. Jenkins, Vice-President of the Western Concrete Pipe Company, "we purchased your equipment on the basis of simplicity of design and the high type of materials and construc-**

tion which you put into them.

**"Our average yearly run of concrete is approximately 100,000 yards, so we must have mixers that will stand up under steady production, and we feel that your mixers will continue to do this for us."**

**Send for Bulletin 112-A. It tells how Ransome 14-S Mixers are designed and constructed—why they "stand-up."**

## Ransome Concrete Machinery Company

**1850 — Service for 79 Years — 1929**

## Dunellen

## New Jersey

**RANSOME  
DOMESTIC  
REPRESENTATIVES**

ALBANY, N. Y.  
Superior Supply Co., Inc.  
ALBANY, N. Y.  
Horizon Chemical Supply Co.  
ALBUQUERQUE, N. M.  
Fremont Machinery Co.  
ATLANTA, GA.  
H. J. Newman M'Chy. Co.  
AUGUSTA, GA.  
J. A. Newman, Inc.  
BALTIMORE, MD.  
B. J. Newman, Inc.  
BIRMINGHAM, ALA.  
Smith-Strawbridge Supply Co. Inc.  
BOSTON, MASS.  
Chas. Wilson Co.  
BUFFALO, N. Y.  
The Wheeler-Murray Co.  
BUTTE, MONT.  
Hall-Feely Machinery Co.  
CEDAR RAPIDS, IOWA  
C. J. Newman, Inc.  
CLEVELAND, OHIO  
C. J. Newman, Inc.  
COLUMBIA, S. C.  
W. Fred Crary and Co.  
CINCINNATI, OHIO  
C. J. Newman, Inc.  
CINCINNATI, OHIO  
The C. Varner Hardware Co.  
CINCINNATI, OHIO  
W. H. Bartholomew Co.  
DETROIT, MICH.  
W. H. Anderson, Tool & Supply Co.  
DALLAS, TEXAS  
W. H. Bartholomew Co.  
DENVER, COLO.  
W. H. Anderson, Tool & Supply Co.  
HUNTINGTON, W. VA.  
H. J. Newman, Inc.  
INDIANAPOLIS, IND.  
Frank Morrison, Inc.  
LONG BEACH, CAL.  
The Crank Co., Inc.  
MEMPHIS, TENN.  
Hedges-Townsend Inc. Co.  
MILWAUKEE, WIS.  
Hess-Scott-Imperial, Inc.  
MOBILE, ALA.  
H. J. Newman, Inc.  
MONTREAL, CANADA  
H. J. Newman, Inc.  
NASHVILLE, TENN.  
H. J. Newman, Inc. and Son  
NEWARK, N. J.  
Newman & Dickinson, Inc.  
NEW HAVEN, CONN.  
The W. H. Crary Co.  
NEW ORLEANS, LA.  
K. O. Olson  
NEW YORK, N. Y.  
Fitzgerald & Hutton  
NORTHPORT, N. Y.  
G. C. MacFarland  
PHILADELPHIA, PA.  
H. J. Newman, Inc.  
PORTLAND, OREGON  
H. J. Newman, Inc. Machinery Corp.  
RICHMOND, ILL.  
Low Island, N. Y.  
RICHMOND, VA.  
H. J. Newman, Inc. Machinery Co.  
ROCKFORD, ILL.  
H. J. Newman, Inc.  
SAN ANTONIO, TEX.  
H. J. Newman, Inc.  
SAN FRANCISCO, CAL.  
Rams & McClelland, Inc.  
SEATTLE, WASH.  
Rear Machinery Co.  
SHEKATON, ILL.  
H. J. Newman, Inc.  
SIOUX FALLS, S. D.  
Lincoln Equipment & Materials Co.  
SYRACUSE, N. Y.  
Shoreway H. Buell  
TOLSON, OREGON  
National Supply Co.  
TOLSON, OREGON  
Chas. Ostrom, Ltd.  
VANCOUVER, B. C.  
C. J. Newman, Inc.



# Legal Points for Contractors

*These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney*

**Edited by A. L. H. Street, Attorney-at-Law**

## Contracting Against Future Contracts

Each of the two parties to a contract may bind himself to certain future conditions, but both cannot preclude themselves by a present agreement from mutually altering that contract or making a new one in the future. As declared by Justice Holmes, when he was a member of the Massachusetts Supreme Judicial Court, "attempts of parties to tie up by contract their freedom of dealing with each other are futile."

The point often arises under construction contracts by reason of the common provisions to the effect that the contractor shall not make any charge for extra work or materials, unless the same is ordered in writing, and the price thereof agreed upon. The general holding of the courts is that such a provision does not preclude the contractor and owner from orally agreeing upon extras.

It may be unwise for a contractor to ignore a clause of this kind, because of the difficulty he may have of proving the fact of the making of a subsequent oral agreement for extras should the owner deny having made such agreement. But if he can prove the oral agreement, he is entitled to enforce it.

This rule was applied in an opinion handed down January 14, 1929, by the United States Circuit Court of Appeals, Fourth Circuit, in the case of *Teer vs. George A. Fuller Co.*, 30 Fed. 2d, 30, a case involving the construction of university buildings. The court said, in part:

"The law properly applicable to these conditions may be said to be fairly well settled, that is, that provisions for extra or additional work are usually contained in the contract between the parties, and the same should control under ordinary circumstances, but this is not necessarily true, nor universally the case, as that would in effect place the contractual rights of the parties here on a plane as if arising under the law of the land instead of under and by virtue of their contractual undertakings with each other. In determining the rights of the parties, each case has to be dealt with and considered in the light of its peculiar facts and circumstances, having regard to the fact that the questions arise most frequently over, and as the result of, occurrences subsequent to the making of the original contract, and as to which the parties have the right to contract either orally or in writing.

"It by no means follows, from the fact that an agreement may be entered into providing only for extras by written consent and approval of the architect in charge, that the parties may not, for reasons satisfactory to themselves, waive or modify their undertakings."

## A Vital Phase of Public Construction Contracts

"While it is true," declared the United States Circuit Court of Appeals, Ninth Circuit, in an opinion promulgated April 1, 1929, in the case of *Rosenberg vs. United States*, 31 Fed. 2d, 838, "contracts with the government are to be construed in the same manner as contracts between private individuals, nevertheless this does not militate against the rule, applicable to public contracts generally, that those who deal with the agents of the public must at their peril inquire into their power to bind their principal."

That was a contract relating to a sale of surplus or scrap material, but it is clear that the same principle applies to construction contracts.

## Materialman Establishes Claim Against Bank

If a contractor's bank fraudulently induced a materialman to withhold steps to secure a lien on funds due from the contractor, by representing that the bank would notify the materialman when a statutory notice had been filed, the bank's officers knowing that the notice had already been filed, and the result was that the bank collected all that was due it from the contractor and turned the balance over to him, leaving the materialman with no means of enforcing payment by the contractor, the bank was liable. That is what the California District Court of Appeal decided in the case of *Camm & Hedges Co. vs. Bank of Covelo*, 275 Pac. 828, disposed of by that court March 29, 1929. Further review of the case in the Supreme Court of the state is pending.

## When the Contractor Is Incapacitated

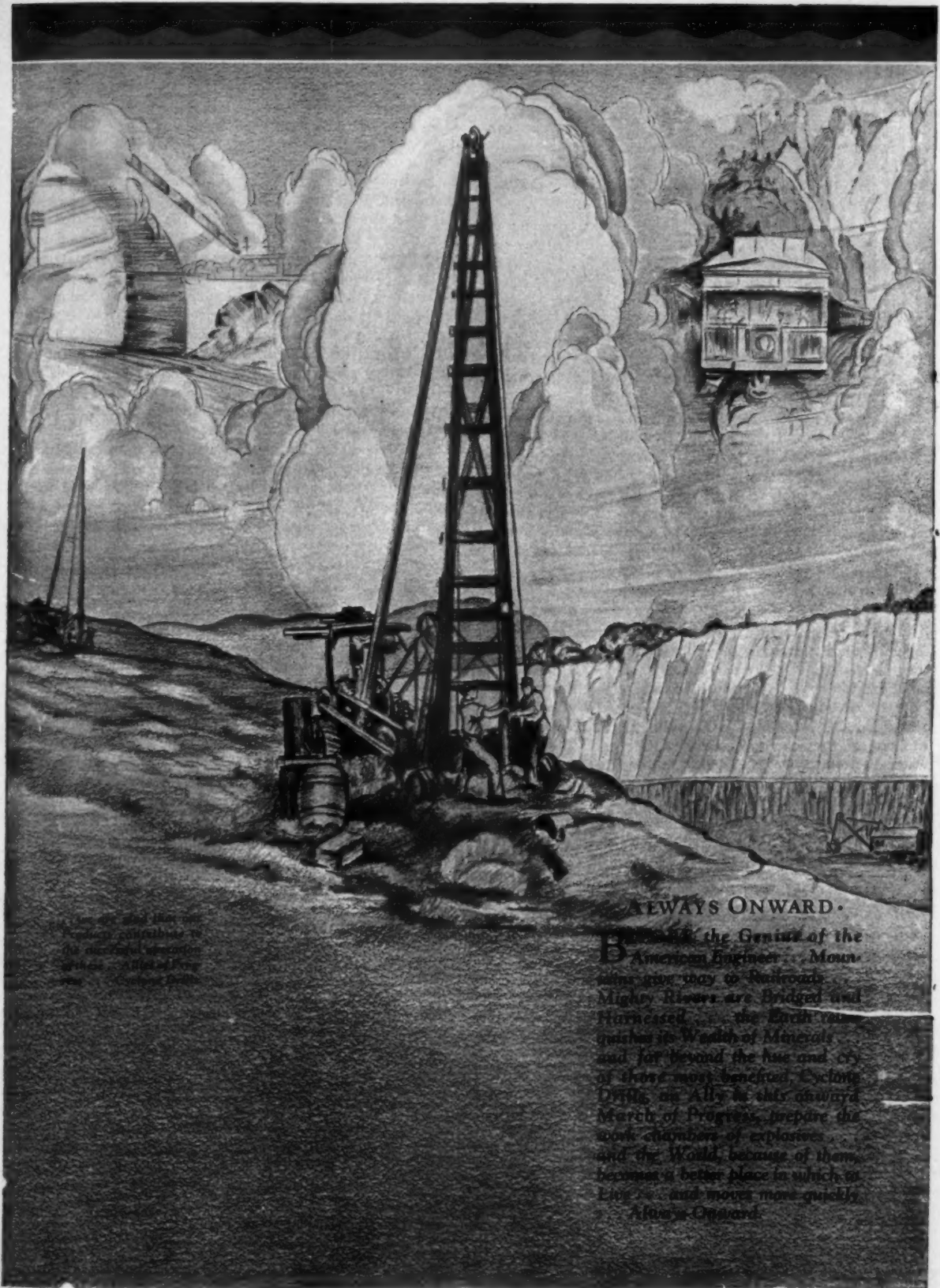
Where personal injury sustained by a contractor or subcontractor through fault of another involves loss of profits on jobs to which the injured man is prevented from giving his personal attention, that loss is a proper item of damages to be assessed against the guilty party.

The Connecticut Supreme Court of Errors recognized that rule of law in an opinion handed down December 18, 1928, in the case of *Ball vs. T. J. Pardy Construction Co.*, 143 Atl. 855. There a subcontractor sued a general contractor for a personal injury and the jury found that the general contractor was at fault. Hence, the only question left in the case was how much damages should be awarded. And the controversy on that point turned on the question as to whether the plaintiff was entitled to recover anything on a theory of consequential loss of profits in the carrying on of pending jobs. This controversy arose under the well-established principles of law that to be recoverable damages must be proved to have been the direct consequence of the injury complained of and the amount must be proved with reasonable certainty. The court said:

"That one, like the plaintiff, is engaged in the performance of certain contracts, may recover in a proper case any losses resulting from additional costs brought about by a personal injury would not seem to admit of doubt. The profit of such a contractor is just as much his means of livelihood as are the wages of a laborer or the fees of a professional man. If by reason of his injury such profits have been lessened or destroyed, the fundamental principle of damages, fair compensation, requires that he be permitted to recover the loss.

"He who seeks to recover damages of this nature must establish a reasonable probability that his injury did bring about a loss of earnings, and must afford a basis for a reasonable estimate by the trier, court or jury, of the amount of that loss. From the very nature of the situation the amount of loss cannot be proved with exactitude, and all that can be required is that the evidence, with such certainty as the nature of the particular case may permit, lay a foundation which will enable the trier to make a fair and reasonable estimate. . . . Certainly a recovery of damages of this nature contains no greater elements of uncertainty than are inherent in many personal injury cases, as, for instance, where recovery is permitted a parent for the decreased earning capacity . . . of a child."





### ALWAYS ONWARD.

**B**ehold the Genius of the American Engineer. Mountains give way to Railroads. Mighty Rivers are Bridged and Harnessed. The Earth reveals its Wealth of Minerals, and far beyond the hum and cry of those most benighted Cyclone Drills, an Ally to this onward March of Progress, prepare the work chambers of explosives, and the World, because of them, becomes a better place in which to live, and moves more quickly *Always Onward.*

**THE ANDREWS STEEL CO., INC. - NEWPORT, KENTUCKY**

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

### Manifest Intention of Parties— Not Words—Governs

Happily, the courts are becoming more and more disposed to place common-sense interpretations on business transactions, rather than to split hairs on the abstract meaning of words used in contracting.

An excellent example applying to the purchase of construction materials, is afforded through the decision of the Court of Appeals of Georgia in the case of Columbus Bagging & Tie Co. vs. Empire Mills Co., 145 S. E. 886, disposed of December 14, 1928.

The bagging company was sued by the mills company for breach of a contract to buy 400,000 brick. The defense was that there was no binding contract of purchase, and that contention turned upon the effect of a memorandum addressed by the buyer to the seller, confirming an offer to buy that quantity of brick at \$10.50 per thousand delivered. There was at the bottom of this memorandum the three words, "Above price accepted," signed on the part of the seller. The Georgia Court of Appeals decided that there was a binding contract, saying:

"It is our conclusion that, from the language used, considered in the light of the circumstances, the plaintiff's acceptance was intended fully and fairly to meet the proposition as presented to it, and, while this view may not be in accord with technical reasoning, we think it harmonizes with what would have been the understanding of reasonably and untechnically minded men in the situation of the plaintiff and the defendant at the time of the transaction in question."

### Right to Sue on Sewer Contractor's Bond

The mere fact that a public contractor's bond recites that it is given pursuant to a statute giving a cause of action in favor of those furnishing labor or materials does not entitle such third parties to sue on a bond given to the public corporation, where the statute is inapplicable to the particular class of contracts. Or, to state the concrete point decided November 26, 1928, by the Pennsylvania Supreme Court in the case of Patterson vs. New Eagle Borough, 144 Atl. 423, where performance of a contract to construct a sewer for a borough was secured by a bond naming the borough as obligee, the fact that the bond recited a statute, requiring contracts with boroughs for the construction of *buildings* to be secured by bond to pay for labor and materials, did not give holders of labor and material claims a right to sue on the bond. The court said:

"Perhaps, since the present work has been substantially completed and finally accepted, there would be no probability of harm to the particular borough here involved if the view contended for by appellant should be taken, namely, that the recital in the bond of the act of 1917, as amended, showed that, notwithstanding the fact that the acts in question had nothing to do with the subject-matter in hand, the parties to that instrument intended voluntarily to enter into and accept an obligation subject to the terms of that Legislation; or, in other words, that the surety company intended to become bound by, and the borough to accept, a bond upon which unpaid laborers and materialmen might sue. Such a decision would, however, constitute a controlling precedent, and it might well be, if we allowed this recital to turn the obligation, assumed only for the benefit of the municipality, into one for the benefit of third parties, that, in some other similar case, where the draftsman of a bond, given for the sole purpose of protecting a municipality, mistakenly recited acts of assembly having no relation to the subject-matter in hand, these third parties would exhaust the security to the detriment of the real obligee. When a municipality is to be placed in such a disadvantageous position, some authority relevant to the particular subject-matter in hand, empowering the action which puts the municipality in that position, must be pointed to. . . . and nothing of the kind is indicated here."

### Coverage by Public Contractors' Bonds

A county drainage district improvement contractor in Arkansas gave a statutory bond to "pay all persons, firms or corporations who perform labor or furnish equipment, supplies and materials *for use in the work hereunder*," etc.

In the case of Leslie Lumber & Supply Co. vs. Lawrence, 11 S. W. (2d) 458, decided December 3, 1928, the Arkansas Supreme Court said concerning the legal effect of this bond:

"It protected all persons who furnished supplies and materials 'for use in the work,' and not merely material actually entering into the work. Therefore all material and supplies furnished the contractor 'for use in the work,' or reasonably necessary to accomplish the purpose of the work, and which were delivered to the contractor for such use and purpose, are covered by the bond. There is no provision in the statute under which the work was being done giving laborers and materialmen a lien, and could not very well have been. For this reason the law requires the contractor to give a bond. The decisions of this court on bonds given to prevent liens on private property can not be controlling here on this question, as this bond covers all labor and materials done and furnished 'for use in the work,' and we are dealing with it on the assumption that it is not a statutory bond. Under this construction of the language of the bond, material furnished for bunkhouses, tent forms, cement sheds, a shop, and a commissary would be covered by the bond if they were reasonably necessary for use in prosecuting the work, as would also cement and other material fabricated for this work and delivered to the contractor therefor, although not actually used therein, because the work was stopped by the board, or for any other reason not due to the material furnished."

### Bridge Contractor's Right to Extra Pay

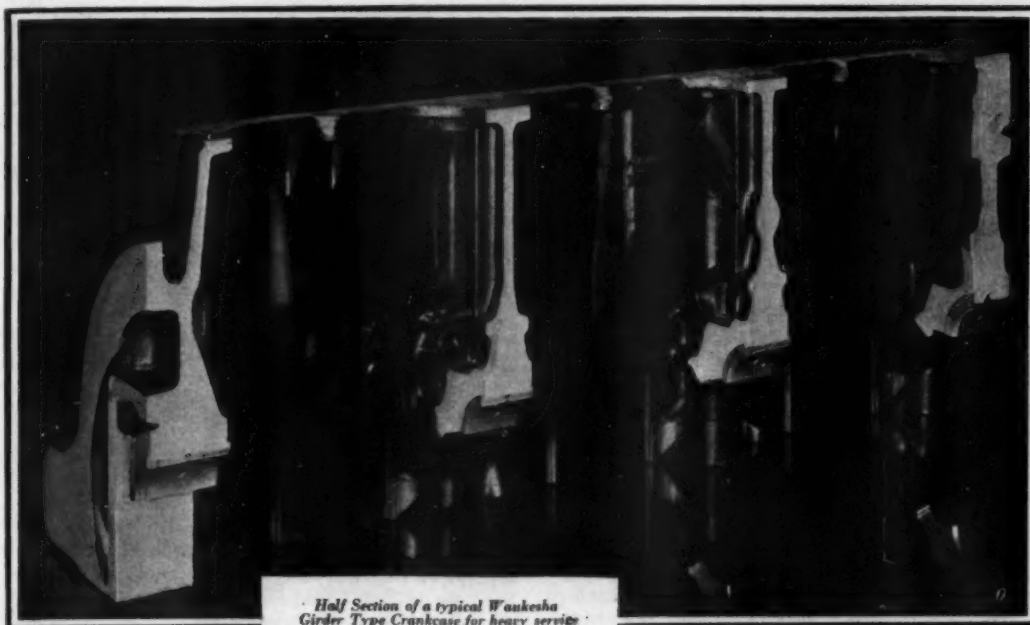
A contract to construct a bridge over a drainage canal required the contractor to bear and maintain necessary detour signs, watchmen, etc., to safeguard traffic while the work was in progress. But provision for constructing a detour and temporary bridge was separately provided for, and it was agreed that this work was to be paid on force account.

Under such circumstances, the Louisiana Court of Appeal decided in an opinion handed down November 8, 1928, in the case of Levasseur vs. Board of Commissioner of Gravity Drainage District No. 1 of Bossier Parish, 119 So. 883, that the contractor was entitled to reimbursement for wages paid a watchman for the detour, stationed on order of the engineer.

### Scope of Bond to Pay for Materials Used on Job

A statutory bond given by a contractor on a Louisiana highway job bound him to pay for "material furnished in the construction, erection, alteration or repair of such road." This bond was held by the Louisiana Supreme Court not to cover supplies furnished for maintenance of the contractor's road camp, for supplies used on a railroad built to haul borrow, for oil and gas used in operating machinery, etc. (State vs. Smith, 119 So. 56, disposed of November 26, 1928.) The court approved the following declaration by the judge of a lower court in which the case was originally tried:

"It will be seen that none of the supplies or materials enumerated entered into the structure of the road embankment. They were used to supply or repair equipment, or for camp facilities for the workmen, or fuel for the machines. The statute grants a privilege for 'material furnished in the construction, erection, alteration or repair of such road.' If this language is intended to describe material entering into and forming part of the structure, according to its specifications and design, it of course, excludes the items enumerated, and such must be the interpretation. While there are equities favoring a different view, the term 'material,' when found in a building statute, generally means something which becomes incorporated as a part of the building would not include 'supplies' not forming part of the structure."



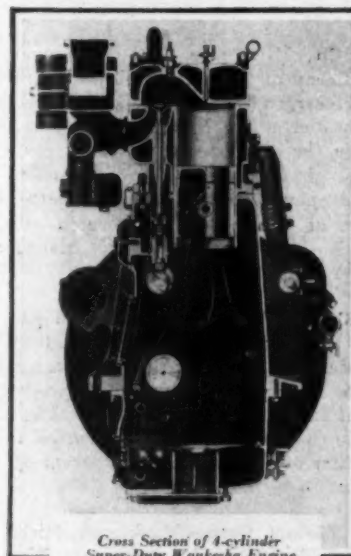
Half Section of a typical Waukesha  
Girder Type Crankcase for heavy service

# A deeper crankcase

for longer life

**T**HE RIGIDITY of Waukesha Super-duty Engines does not depend entirely upon their overstrength crankshaft. The Waukesha patented "girder" type crankcase is also designed for extra rigidity—both in bending and torsion.

Waukesha's super-duty cylinders are held by flanges midway up on the barrel, making the crankcase six or eight inches deeper. Its ribbed cross walls are combined with wide bottom flanges. Behind the valve tappets, running the entire length of the engine, is an extra rib that helps tie the four cross walls together. This construction increases stiffness and rigidity tremendously. Maximum bearing life is thus assured, as well as extreme smoothness and freedom from destructive vibration. Bulletin No. 540 gives all details. Write to Industrial Equipment Division, Waukesha Motor Company, Waukesha, Wisconsin, Offices: 8 West 40th Street, New York—7 Front Street, San Francisco.



Cross Section of 4-cylinder  
Super-Duty Waukesha Engine

# WAUKESHA ENGINES

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



## Construction Industry News

**Hercules Motors Corp.**, Canton, Ohio, have again found it necessary to add to its plant and equipment in order to provide adequate facilities for the production of Hercules engines and power units. The new expansion program provides for enlarging the plant capacity between 50 and 60 per cent and the employment of some 600 additional workmen. A tract of  $3\frac{1}{2}$  acres adjoining the present plant has been acquired and construction has already been started on the new factory building. This unit will add 68,000 square feet of floor space to the present facilities and it is expected that it will be completed well before the first of the year.

**M & M Wire Clamp Co.**, Minneapolis, Minn., has announced the recent purchase of the Minneapolis branch of the Bowen Products Corp., in order to increase the production facilities of the company. This plant is equipped to manufacture the M & M products and makes possible locating the factory warehouse and office in one building. The address of the new plant is 983 17th Avenue, S. E. Minneapolis, Minn.

**Manitowoc Engineering Works**, Manitowoc, Wis., has announced that the following companies have taken on the sales and service of Moore Speederanes, shovels, draglines and trenchers and Buffalo-Manitowoc clamshell buckets: M. G. Hennessey Machinery Co., 1115 Boatmen's Bank Bldg., St. Louis, Mo.; Ohio Equipment Sales Co., Bedford, Ohio; Thos. J. Crowe, 124 S. Walter St., Albuquerque, N. M.; H. E. Green, 505 Fox Bldg., Philadelphia, Pa.

**Chain Belt Co.**, Milwaukee, Wis., has announced the recent appointment of Robert B. Marshall, former conveyor sales engineer, to the Chain Belt staff. Mr. Marshall, who will be located at the New York office at 50 Church St., will handle the complete line of Rex conveyors and belt conveyors, glass batch handling equipment and silo storage systems manufactured by the Stearns Conveyor Co., a division of Chain Belt Co., located at Cleveland. W. H. Quinn is the New York District Manager for the company.

**Bay City Shovels, Inc.**, Bay City, Michigan, has announced that work on its new office building has been started in order to increase plant facilities. This new building will be located on the company's property adjoining the present factory. This announcement is made coincident with the completion of a new fireproof factory and is a continuation of the expansion program of Bay City Shovels.

**Continental Motors Corp.**, Muskegon, Mich., has announced the establishment of a permanent Western office at 1855 Industrial Street, Los Angeles, Calif. This will include a general sales office and exhibition hall for displaying the various Continental engines. Ray Long, who for the past five years has been Assistant Manager of the Industrial Division of Continental Motors, will be Manager of the Western branch and will have complete charge of sales of the entire line of Continental motors in that district.

### A Concrete Pavement for Testing

**A** CONCRETE test pavement about  $\frac{1}{2}$ -mile long, made up of slabs 9 feet square and 7 inches thick, is being constructed at the Arlington Experiment Station of the United States Department of Agriculture by the Bureau of Public Roads. When tests are made engineers of the Bureau hope they will be able to show that the prevailing mixtures used in making concrete for roads may be modified by the use of a larger proportion of coarse aggregates such as gravel, slag or crushed stone, so as to affect a substantial saving in cost and at the same time increase the strength and durability of the concrete.

The prevailing mixture for concrete pavements is 1 part cement to 2 parts sand to  $3\frac{1}{2}$  parts of crushed stone or gravel. It is believed that it is possible to secure as good concrete when the proportion of broken stone or gravel is increased to  $4\frac{1}{2}$  parts, which will result in a great saving in the cost of road construction.

The test road is being built just as an ordinary concrete road would be constructed except that the mixture for each slab will contain a different kind or amount of coarse aggregate and a different quantity of water. Mixing, placing and finishing of the concrete will be done in accordance with modern paving practice, using standard equipment. After curing, the slabs will be drilled for cores and subdivided into beams suitable for flexure or bending tests.

Supplementary tests will also be made on beams and cylinders cast at the time the pavement slab is placed, which will show the relationship between the strength of molded specimens and that of specimens cut from pavement slabs.

### A New Freight-Handling Pier in Baltimore

**A** NEW export and import freight-handling pier is being constructed at the foot of McComas Street, Baltimore, by the Port Development Commission of the City of Baltimore. The estimated cost of this pier is \$7,500,000 and it is said it will be one of the most complete freight-handling piers in the country.

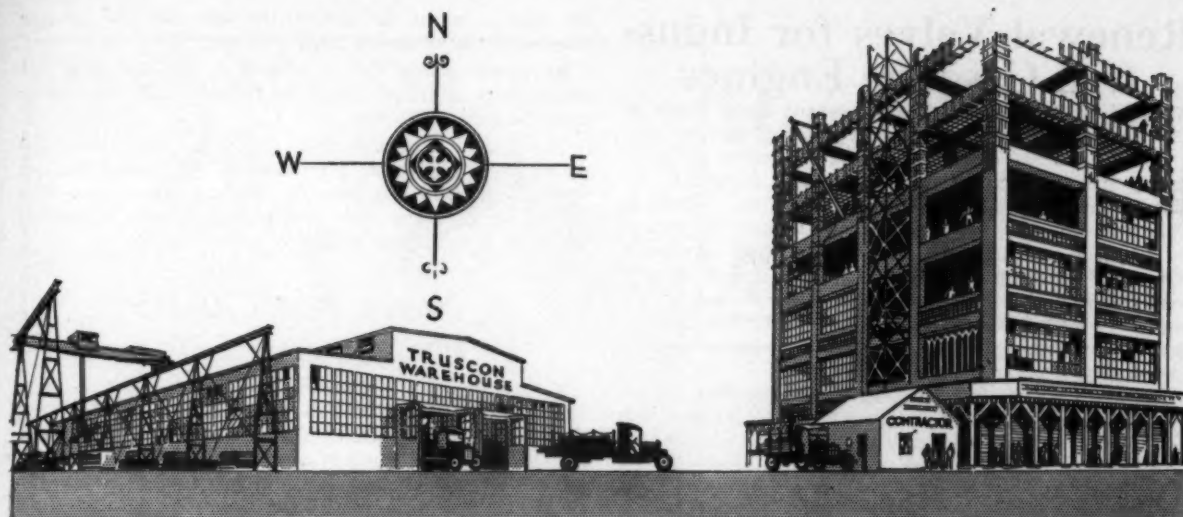
The steel superstructure on each side of the warehouse will support cranes with slings to load and unload cargoes, and thus permit a more rapid transfer of the cargo than by the ship's rigging method.

Pugh Bros., contractors on this pier construction job, used a Link-Belt gasoline crawler crane, equipped with a 60-foot boom and goose-neck extension, for erecting the steel work.

### House Moving in Japan



*In the course of the expensive street widening operations in Tokio which have been under way continuously since the earthquake of 1923 numerous houses had to be moved to new locations. Above is shown one of the more substantial structures being raised preparatory to migrating to a new site.*



# NEAR YOU!

## A TRUSCON WAREHOUSE

FOR IMMEDIATE DELIVERY OF STEEL BUILDING PRODUCTS

### REINFORCING STEEL

Rib Bars      Welded Steel Fabric  
Column Hooping      Steel Inserts

### STEEL WINDOWS

Casement Windows  
Basement Windows  
Pivoted Windows  
Projected Windows  
Utility Windows      Steel Lintels

### STEEL DOORS

Swing and Slide Types  
Single or Double Units  
Steel Frames

### ROAD REINFORCEMENT

Welded Steel Fabric  
Reinforcing Bars      Curb Bars  
Contraction Joints      Edge Protectors

### METAL LATH

A Metal Laths      Cornerite  
Diamond A Lath      Stripite  
Diamond Rib Lath      Corner Beads  
¾" Hy-Rib      Channels  
Diamond Lath      Base Screeds  
Stucco Mesh      Partition Channels  
Self-Furring Lath      Mortar Boxes

Well-stocked and well-equipped warehouses in the principal distributing centers throughout the United States, make immediately available Truscon's large manufacturing facilities, nation-wide engineering service, and complete lines of Steel Building Products. Your jobs are never held up pending the arrival of these materials as shipments are made immediately. These nearby warehouses have complete modern machinery for economical handling and for such fabrication as is necessary. Leading contractors rely upon Truscon as the source for all Steel Building Products, because of their superior quality, dependable service, prompt delivery and economical cost.

*Write for complete information and quotations.*

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

Trussed Concrete Steel Company of Canada, Limited, Walkerville, Ont.

Warehouses and Offices in Principal Cities

# TRUSCON

## STEEL BUILDING PRODUCTS

## Renewal Valves for Industrial Gasoline Engines

**T**HE extensive use of gasoline engines on all kinds of power-operated construction equipment used by contractors, has created a demand for valves of higher quality in both mechanical strength and heat resistance. Industrial Engine Parts, Inc., 1053 East 61st St., Cleveland, Ohio, has been developing a type of valve to meet this demand correctly and to help reduce the maintenance cost on engines. About four years ago this organization began a series of tests with Vulcan super-heat-resisting valves on motors used in construction work. Since the performance was all that could be desired, Industrial Engine Parts decided to supply them for use on contractors' and industrial equipment.

These valves are so designed and treated that they are not distorted or corroded by heat in gasoline, kerosene and diesel engines under the terrific pressures created in these engines under severe service. Special attention has been given to the demand for over-size head valves where it is desired to make a first class repair eliminating the expense of fitting new valve seats to a worn block or cylinder head.



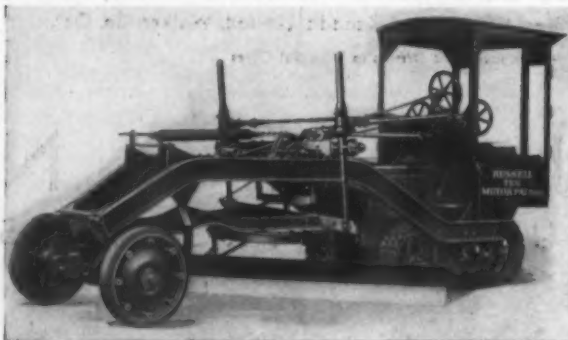
*One of the Heat-resisting Valves Made by Industrial Engine Parts*

## Two New Motor Patrols

**T**WO new motor patrols, the Russell Ten and Fifteen, have recently been developed by the road machinery division of the Caterpillar Tractor Co., San Leandro, Calif. These new patrols are simple in construction, with many wearing parts eliminated. The blade lift is more powerful and the entire mechanism is easily controlled from the driver's seat by means of four easy turning wheels.

One of the outstanding features is the blade-lift mechanism, which consists of a machine-cut round steel screw, which is connected to the circle cross-bar by a large ball and socket. Take-up shims are provided for wear. The screw is operated by a large bronze nut mounted between ball bearings. The nut operates by a set of steel machine-cut bevel gears. There is a take-up for the ball bearings which take both the up and down thrust. The entire screw and gear mechanism is enclosed in dustproof housing.

Four easy turning wheels, placed in front of the operator, give complete command of the machine at all times. At the top is the steering wheel, turning the steel-cut worm and gear steering control. At the right and left are the screw blade-



*The New Russell Ten Motor Patrol Recently Developed by Caterpillar Tractor Co.*

lift wheels, and at the bottom, the side shift and scarifier wheel operating through a single gear box.

By merely pulling out or pushing in the steel plug and wheel, gears are shifted to operate the side shift and scarifier from the same wheel.

The tractor connection gives flexibility. The tractor and grader frame connection is mounted in self-aligning bearings with the trunnion shaft centrally located on the tracks. This mechanism gives free movement without binding or bending strain on either tracks or grader frame.

## A New Air Cushion Expansion Joint

**A**N air cushion expansion joint has recently been developed by the Truscon Steel Co., Youngstown, Ohio, consisting of metallic sides forming a free air space for expansion. This space is closed at the top by a bellows-shaped piece of galvanized, copper-bearing steel which prevents dirt working into the joint from the surface of the pavement.

A dowel plate which is continuous from curb to curb is incorporated in the joint by an ingenious arrangement which permits all necessary expansion and contraction movements without losing its effectiveness in keying together the adjacent slabs of pavement. If desired, the joint may be manufactured without the dowel plate, and may be punched to receive dowel bars.



*The Truscon Steel Expansion Joint the Metallic Sides of Which Form a Free Air Space*

Advantages of the new air cushion expansion joint are that it is quickly and accurately placed, it permits all necessary expansion and contraction of the pavement without impairing the surface, it does away with the tendency of incompressible soil to fill opened contraction joints since only air is squeezed out of the joint and only air can fill it, and it does not interfere with the normal spreading, rolling, floating or belting operations incident to paving construction.

The placing of either type of joint requires no header boards. Driving the steel supporting pins is quickly done with a hammer or the special driver that does not even require the workman to stoop to start or drive the pin. The joint sections can be dropped in place in the pin slots as fast as they can be handed to the placer and need no more attention until after belting. As the joints come in 5 and 6-foot lengths all the pins but one may be driven and all but two joint sections may be placed before the mixer passes. The last pin and the two joint sections may easily be placed between batches without delay to a batch.

Batches may be dumped on top of the joint or on either or both sides indiscriminately and the finishing machine may be used as though the joint were not there. The joint is later cleaned out and edged with a long-handled cleaner and edger. No bridge is necessary.





Central mixing plant with 20-sack batch mixer. At the right is shown the application of the "Hunt Process" on hexagonal type pavements. Operator standing on seven-day-old concrete.

## "Hunt Process" Assists in Remarkable Run



**Contractor-**  
**pours 92,067 sq. yds. in 16 days-**

**A**VERAGING 5,754 square yards a day (799 cubic yards), George Oswald, Los Angeles contractor, poured 92,067 square yards of 5-inch concrete paving in 16 eight-hour days—a record made practicable by using the "Hunt Process" cure.

Pavement was laid in a tract within one mile of a central mixing plant containing a 20-sack batch mixer. By using the "Hunt Process," two men alone handled the curing of this tremendous run. Under similar conditions, this established method of curing will help any contractor get similar results.

The "Hunt Process" is an accepted method among progressive contractors throughout the country. It opens the road days earlier—hastens the job's acceptance—gives 8½% stronger concrete and increases resistance to abrasion. Can be used to advantage on any form of concrete work. Write on your letterhead for descriptive booklet.

**McEVERLAST, INC.**

111 West Seventh St.

Los Angeles, Calif.

35 E. Wacker Dr.  
Chicago, Ill.

1754 Graybar Bldg.  
New York, N. Y.

1314 Magnolia Bldg.  
Dallas, Texas

Offices in Principal Cities



*The New Hairpin Clip Machine*

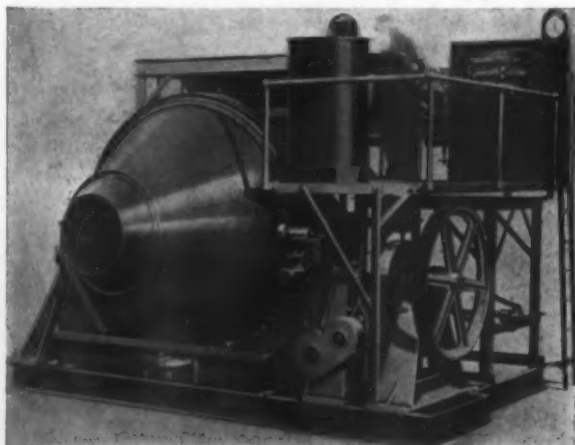
## Small Machine Makes Clips and Ceiling Hangers on the Job

**T**HE new Steelcrete hairpin clip machine has been designed by the Consolidated Expanded Metal Cos., Wheeling, W. Va., to enable a lather to make his own hairpin clips and ceiling hangers right on the job. With this small machine a straight piece of rod, cut to the desired length is placed in the proper slot and the lever pulled down and the completed hairpin clip removed.

All wearing parts of this machine are made of steel and are renewable. It weighs only 12½ pounds and uses wire from No. 11 to No. 6 gage. These hairpin clips are used for attaching channel furring and the machine makes clips of three sizes, 2¼, 2½ and 3 inches.

## New Proportioning and Mixing Unit for Weighing All Aggregates

**T**HE development of a new mixer attachment that enables contractors and those operating concrete plants to weigh all aggregates has recently been announced by the T. L. Smith Co., Milwaukee, Wis. This new device, known as the Smith Weigh-Mix, when added to a standard Smith mixer and batch-hopper, forms a complete self-contained concrete manufacturing unit. The new equipment is designed to proportion accurately all materials by weight and then thoroughly mix them. Only one man is required to handle both proportioning and mixing operations. The controls are centralized on a platform which is so located that the operator has a full view of the entire plant.



*The New Weighing Mixing Unit for Use with Smith Mixers*

The scale has a separate beam for weighing the coarse and fine aggregate as well as the cement. An auxiliary scale weighs the water. The scales can be locked by the inspector and the operator need watch only the dial pointer to know when the predetermined amount of material has been weighed.

Another feature is the automatic shaking device which completely cleans the hopper and allows the scale to return to balance. The speed of emptying the hopper is also considerably increased by the shaker. But at no time while the hopper is vibrating does it come into contact with the weighing mechanism.

This unit is specially adapted for use in central mixing plants, from 6 to 10 feet in height being saved compared to ordinary overhead weighing units. This new Smith Weigh-Mix may be applied to any Smith mixer now in the field.

## A Tractor One-Man Grader Combination

**A** NEW unit made up of a Trackson tractor and a Wehr one-man grader has recently been put on the market by the Trackson Co., 519 Clinton Street, Milwaukee, Wis. This outfit, known as Model LHA, is a combination of a crawler tractor and a one-man grader, both of which have



*The Model LHA Trackson-Wehr One-Man Grader Unit*

already been used separately with success. With the increased power, traction and sure footing provided by the Trackson McCormick-Deering, the grader is able to handle the toughest highway jobs under very difficult conditions. Ditching, crowning and finishing new roads, reconditioning and maintaining old ones, building subgrades for paved city streets, breaking up and removing snow are some of the jobs that can be handled with this unit.

The one-man operation of this equipment provides a more economical operation than types where an extra man is needed to operate the tractor. The Trackson-Wehr unit is useful the year round and the grader is readily detachable from the tractor so that the latter may be used for drawbar and other general utility purposes.

---

*Safety, as in any other economic movement, cannot be cramed down the throats of business men. Best results can only be obtained through the dissemination of sound information on the subject of accident prevention to all of the elements engaged in the entire industry. When a contractor becomes aware of its economic worth and at the same time knows where he can procure intelligent and practical information on the subject, his cooperation becomes voluntary, active and real.*

---

**Newark**  
 REINFORCED CONCRETE PIPE  
*"It makes a better joint"*

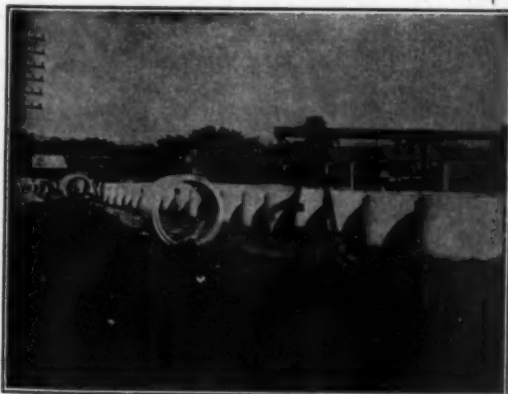
**Easily laid at  
 small expense  
 with perfect  
 flow line.**



**NEWARK CONCRETE  
 PIPE COMPANY**

462 Broad St.

Newark, New Jersey



**It handles like  
 a 7S....but it  
 holds 2 Bags**

**Jaeger Gains 50%  
 Extra Strength...Throws  
 Off 1000 Lbs. Dead Load  
 to Build this Faster, more  
 Portable 10S Mixer**

Built of steel	One man control
Short coupled, direct driven	Automatic Skip Shaker
100% ball bearing	Fast accurate measure water tank
Machined steel tracks	Spring hung chassis
Chilled ground faced rollers	Dual tire wheels, roller bearings
Big drum openings	Minimum wear and power consumption



Other Non-Tilters in 7, 14, 21, 28 ft. Sizes.  
 Tilters 3½, 5, 7, 10, 14 ft.  
 Pumps—all sizes and types.

**Outselling all Other  
 7S Mixers**

Sensational one-bag Speed King trailer with end discharge—low charge or loader type. Write for special price.



THE JAEGER MACHINE CO.  
 701 Dublin Ave., Columbus, O.

Send catalog, prices and terms on

☐ Non-Tilters ☐ Plaster Mixers ☐ Tilters  
 7, 10, 14, 21, 28 ft. 1 and 2 Bag 3½, 5, 7, 10, 14 ft.  
☐ Contractors Pumps—Towers—Holsts  
 (Check where interested)

Name \_\_\_\_\_

Address \_\_\_\_\_

Date \_\_\_\_\_





*The New Pickering Governor*

## A New Type of Governor

**A** NEW type of Pickering governor suitable for use on the 15-27 horsepower John Deere tractors has recently been developed by the Pickering Governor Co., Portland, Conn. This governor, like other Pickering models of either steam or gas tractor types, responds instantly to the slightest change in load, which gives power when it is needed. Fuel is saved by this automatic control of the motor when the load is dropped.

Provision is made for readily changing motor speed, thus making the John Deere tractor, for which this governor was specially designed, adaptable to various types of work.

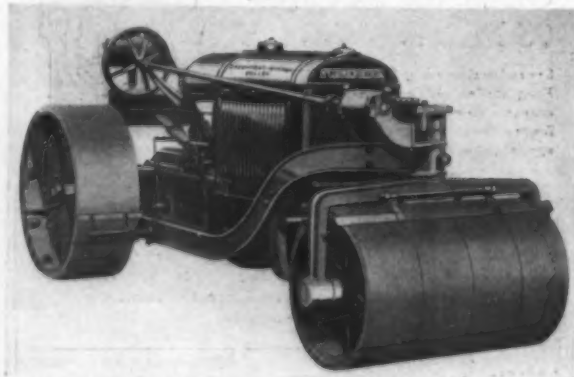
The governor is a gear-driven model, can be attached in an hour's time without removing any original equipment and appears as an integral part of the motor.

## A General Purpose Convertible Roller

**A** NEW roller to be known as the Davenport-Winchell roller has recently been announced by the Davenport Locomotive & Manufacturing Co., Davenport, Iowa. This new piece of equipment is designed for general roller service in the contracting field and for many other applications where a light weight roller may be found useful. The new roller is made in three weights,  $3\frac{3}{4}$ ,  $4\frac{1}{4}$  and  $5\frac{1}{4}$  tons.

The Davenport-Winchell roller may be furnished complete with power plant or frame and rollers may be obtained separately and attached to a tractor. The roller attachment is easily put on or detached, thus providing either tractor or roller according to the requirements of the job.

A side cranking device is provided which greatly facilitates starting the motor. The seat location provides the operator with an unobstructed view. An improved worm and segment steering gear makes steering rapid and easy. The front roller is divided equally into four sections, giving a differential action to facilitate turning. A non-rigid cradle connecting the roller frame to the tractor rear axle keeps the power plant in alignment, and eliminates twist when operating over uneven ground.



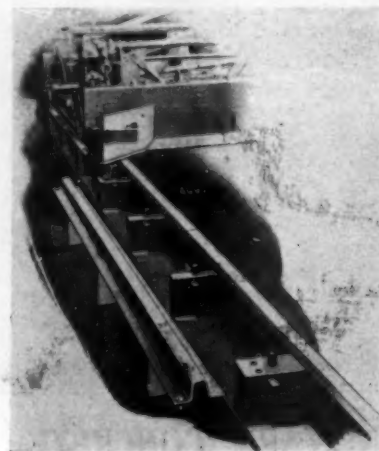
*The New Davenport-Winchell Roller*

## Rail Forms for Concrete Roads

**N**EW Lakewood Duo-Rail forms for use in concrete roads have recently been developed by the Lakewood Engineering Co., Cleveland, Ohio. These forms are designed to get a smoother riding surface. The outstanding feature of this form lies in the fact that the load of the finishing machine is carried over the center of the base of the form by means of an auxiliary rail, thus adding to the stability and bearing value of the form.

These rails are held in place on the stake pockets by dowel pins fastened thereto, fitting into the holes in the stake pockets, and approximately 100 feet of the auxiliary rail is all that is used on each side of the road for the finishing machine operation, the rail being carried forward as the work progresses.

The base of this form is 8 inches wide and is claimed by the manufacturers to offer almost three times the bearing value of the present standard base form. The auxiliary rail is used only for the finishing machine, the floatbridges and other lighter equipment being carried as usual on the form proper, which also acts as the template for the screed member of the finishing machine.



*The New Lakewood Duo-Rail Forms*

## New Four-Speed Tractors

**A** NEW four-speed tractor, known as the United, has recently been announced by the United Tractor & Equipment Corp., 612 North Michigan Avenue, Chicago, Ill. This tractor, which in low gear pulls 3,000 pounds and in second gear, 2,500 pounds, is powered by a specially designed Continental S-10 4-cylinder water-cooled motor, making 1,200 rpm. The cylinders, which are cast in block, are made of special alloy cylinder iron. The crankshaft is of the three bearing type of high grade steel. The camshaft is of drop forged steel, case hardened and ground, and the pistons are of light alloy iron  $4\frac{3}{4}$  inches long with  $3\frac{1}{4}$ -inch cast iron rings.

This tractor has a pressure lubricating system operating from a gear-driven pump to all the main bearings. All wheels, steering mechanism and moving parts are fitted with Alemite-Zerk fittings for pressure greasing. The transmission is the automotive unit power plant type, with four speeds forward and one reverse. The gears of forged alloy steel are accurately cut and shaped. Ball bearings and Timken roller bearings are used for all bearings in transmission.

The front wheels are 28 inches in diameter and the rear wheels, 42 inches in diameter. The wheel equipment includes front wheel guide rims and spade lugs for the rear wheels.



## 6 MONTHS AGO

**THERE WERE NO  
TYPE "G" BINS**

**AND NOW**—22 States have one or more installations. One Contractor alone purchased 4 plants since the first of the year. Why? Because in it is incorporated everything a Contractor desires.

### **LARGE CAPACITY WITHOUT SACRIFICING PORTABILITY**

The 60 and 74 ton plants are shipped in two pieces with AggreMeters attached. The 73 and 91 ton plants in three sections. The Type G plant can be had in two or three compartments. Illustration shows a two compartment type G with Volume-Weighing AggreMeters.

### **ERIE CLAMSHELL BUCKETS**

are ideal for loading AggreMeter plants. They are fast and secure full capacity at every grab.

*Send for Bulletins*

## **THE ERIE STEEL CONSTRUCTION CO.**

Box 8, So. Erie Station

Erie, Penna.

What the  
**JOHNSTON**  
Trade Mark  
Means  
to  
**YOU!**



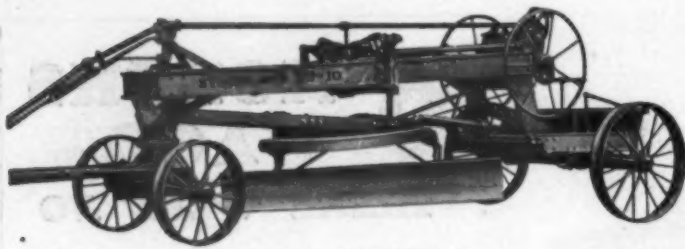
The Johnston Trade Mark on your boiler means *efficiency* and *satisfaction*. It means maximum production, without interruption, at minimum cost of operation. It assures the rugged strength and reliability that means power, speed and economy, day after day in fair weather and bad, on all

kinds of jobs. All over the world on more than 5,000 boilers you'll find the Johnston Trade Mark—it is the recognized mark of boiler quality wherever boilers are used.

When you buy contracting equipment demand the Johnston Boiler. It is made to meet all requirements.

**JOHNSTON BROS. INC., Ferrysburg, Mich.**

*Specializing in Boilers for Contractors' Equipment*



*The Stockland 50-10 Grader*

## A Road Grader With Low Center of Gravity

**A** ROAD grader with a low center of gravity design but plenty of blade clearance has recently been announced by the Foote Bros. Gear & Machine Co., 111 N. Canal Street, Chicago, Ill., who have recently taken over the Stockland Road Machinery Co., Minneapolis, Minn.

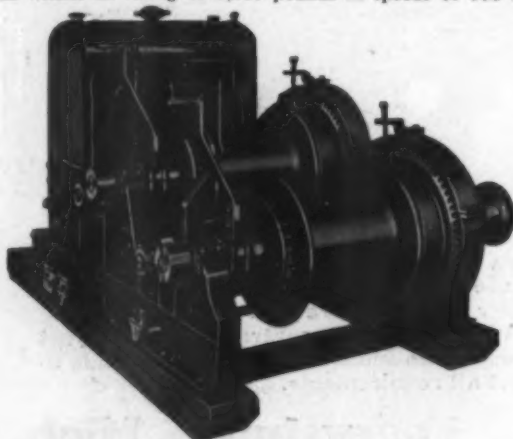
The center of gravity of this grader comes directly through and very close to the center of the blade. The greatest amount of pressure is placed on the blade, when the grader is in action, at the point where the center of gravity line comes through the cutting edge of the blade. Since this point of pressure is very close to the center of the blade it is evident that the blade is constantly taking a full capacity cut at all times. With the greatest pressure close to the center of the blade, the blade must take a larger cut of earth.

Other features of the Stockland grader are the cut, lift, roll, curved blade, the location of the blade, extra long wheelbase, three point suspension, fewer working parts and double heavy frame construction.

## A Complete Series of Hoists for Contractors' Equipment

**A** STANDARDIZED series of Brown Giant-Line industrial hoists, made in 12 models and ranging from 4 to 50 horsepower, is manufactured by the Brown Clutch Co., Sandusky, Ohio. These hoists are made in single and multiple drum, reversible, non-reversible and conveyor types and are designed to meet a variety of needs in the construction field. They are powered by either gas or electric motors and have gear, chain or belt drive.

Model 40-H, a standard high speed hoist, equipped with 35 horsepower, is designed for single wheelbarrow or other loads within its rating of 1,750 pounds. When equipped with 50 horsepower, it will hoist two wheelbarrow elevators or other loads within its rating of 2,400 pounds at speeds of 500 feet



*The Model-A Brown Giant-Line Hoist*

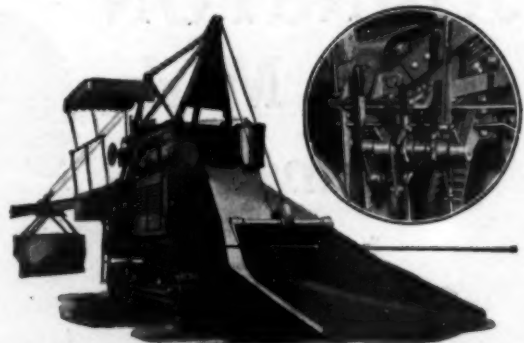
per minute. This model, as are all others, is provided with the exclusive bronze screw thrust, bronze bushings, Timken and ball thrust bearings and Alemite high pressure lubrication. The side frames are cast separate from the main frame, pawl ratchets cast separate from the drum, cone gears separate from the cone to insure against long delays in case of accidents.

Model 40-A, shown in the illustration, will hoist a  $\frac{3}{4}$ -yard concrete bucket on one side of a tower and a three-wheelbarrow elevator on the other at a speed of 200 feet per minute.

Similar to Model 40-A is Model 40-D, the standard drag-line hoist. This was designed especially for drag line operations in sand and gravel pits, peat beds, excavating, leveling, back filling and similar work. Equipped with 35 horsepower it is suited to  $\frac{3}{4}$  to 1-yard scraper operations. Inhaul speed is 200 feet per minute and outhaul speed 300 feet per minute. The standard inhaul ratings are 4,000 and 5,000 pounds single line pull at 200 feet per minute respectively with 35 and 50 horsepower.

## A New Water Control for Pavers

**A** WATER tank for pavers, constructed on a new principle which effects an accurate control of water to a fraction of a gallon under all conditions, has recently been developed by the Foote Co., Nunda, N. Y. The new tank is of the vertical cylindrical type, with a capacity of 46 gallons, and can be set so that it automatically measures any desired quantity of water either in pounds or gallons by a simple turn of an adjusting crank. The tank fills automatically and signals the operator when it is full, the control system being so arranged that the supply valve through which the tank is filled always closes in advance of the discharge valve, which connects to the mixer drum through a  $5\frac{1}{2}$ -inch line, and which permits quick discharge of water. Also the discharge valve closes automatically before the supply valve can be opened in order to insure only the proper amount of water getting into the drum.



*The Foote Paver with New Water Control and Detail of Control*

The tank contains a piston, in the head of which is a single automatic valve, which permits the air to escape when water enters the portion of the tank underneath the piston. The piston is adjustable to a graduated scale, so that it can be set to measure any desired quantity of water in either gallons or pounds. When the portion of the cylinder below the piston is completely filled with water the air valve in the piston head closes, and the resulting pressure automatically closes the water supply valve before more than 5 pounds pressure has been built up on the tank.





Curcrete being sprayed on North Carolina State Highway, Route No. 21, just outside of Lillington, North Carolina

## Use this perfect curing method for concrete pavements!

Curcrete is an asphalt-emulsion manufactured specifically for the purpose of curing concrete. It eliminates all other curing agents—no water, bur-lap, earth or hay. Asphalt-emulsion cure has been in use for three years and has been officially adopted by many states and municipalities.

Curcrete is applied by means of a pressure spray immediately after the concrete surface has been belted or broomed. The sufficiency and thoroughness of the application are visible, and no further attention is required by either contractor or inspector.

The Curcrete method stops evaporation of water immediately, and thus prevents surface checking and subsequent scaling, and insures maximum strength. And the Curcrete process is low in cost as well as fool-proof in application and efficient in action.

One gallon of Curcrete is sufficient to cover 8 to 10 square yards, and with our specially-designed sprayer one man can easily apply Curcrete to all the surface that can be laid by one mixer—at the rate of 150 to 200 square yards per hour.

We shall gladly send you the Curcrete booklet which gives the result of tests and complete information about Curcrete.

### THE BARBER ASPHALT COMPANY

New York      Philadelphia      Chicago  
Pittsburgh      St. Louis      Kansas City      San Francisco

"Curcrete" (trade-mark registered) is sold for use in the curing of concrete by the "Curcrete" method (U. S. patents 1,839,763 and 1,884,971, and foreign patents pending) controlled by The Barber Asphalt Company. The Barber Asphalt Company grants to the purchasers of "Curcrete" the right and license to practice the "Curcrete" method of curing concrete, controlled by it, in connection with the use of "Curcrete" produced by it, and the purchasers by accepting "Curcrete" accept the license and acknowledge the company's rights in connection with the "Curcrete" method.

# CURCRETE

# FLORY

## "FLOR-OX" 35 and 50 LEAD IN THE GENERAL CONSTRUCTION FIELD

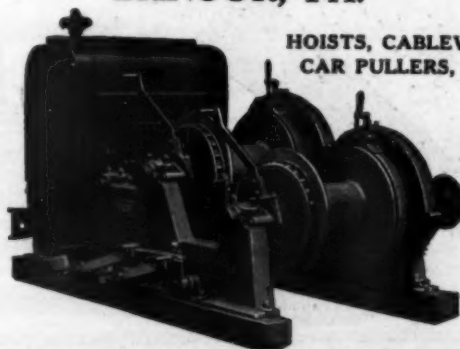
FLORY'S New Hoists—the "FLOR-OX" 35 and 50—have many new features that make them leaders in the hoisting field. The "FLOR-OX" is marked by smoothness of operation, the utmost dependability and extreme ruggedness of construction. It can be powered by either a gasoline or electric motor and it can be altered in the field from a single to double or triple drums by bolting units together. Before you buy a hoist send for the bulletin on this new hoist. It has no equal in the general construction field.

## FEATURES OF THE "FLOR-OX" 35 and 50

ROLLER BEARING THRUSTS FOR FRICTION  
CLUTCHES  
LESS WEIGHT AND SPACE WITH GREATER  
EFFICIENCY  
POSITIVE RELEASE DEVICE ON FRICTION  
LEVERS  
ALEMITE LUBRICATION  
THE "35" HAS A ROPE PULL OF 5000 POUNDS  
AT 165 FEET PER MINUTE  
THE "50" HAS A ROPE PULL OF 7000 POUNDS  
AT 165 FEET PER MINUTE  
EXTRA HEAVY SHAFTS AND BEARINGS  
SILENT CHAIN DRIVE ENCLOSED IN DUST  
PROOF CASING  
MACHINE CUT TEETH ON ALL MAIN GEARS  
AND PINIONS

## S. FLORY MFG. CO. BANGOR, PA.

HOISTS, CABLEWAYS,  
CAR PULLERS, ETC.





*The Rear Power Take-off of the Caterpillar Tractor*

## A New Power Take-Off for Tractors

**R**EAR power take-off can now be secured for the Caterpillar Sixty, Ten and Fifteen tractors and front power take-off is also available on the Ten and Fifteen, according to a recent announcement from the Caterpillar Tractor Co., San Leandro, Calif.

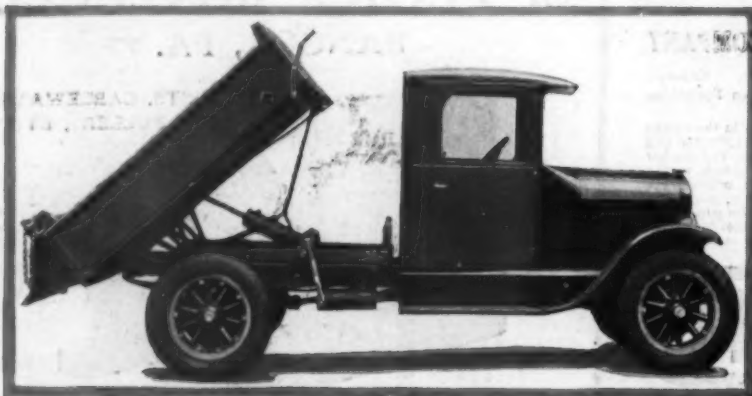
At a governed engine speed of 650 rpm the Sixty power take-off operates at 284 rpm. The connection is a tapered stub SAE 2 3/4-inch taper. The shaft is located on the center line of the tractor 31 13/16 inches from the ground. The shaft on all models turns clockwise as one faces the shaft.

The Ten rear take-off operates at a speed of 538 rpm when the motor speed is 1,500 rpm; the Fifteen at 536 rpm with an engine speed of 1,250 rpm. Both have a six spline 1 1/8-inch connection.

Caterpillar tractors when equipped with power take-off can be stopped, or the engine speed reduced, by disengaging the steering clutches, without in any way affecting the speed of the power take-off.

## A New Hydraulic Hand Hoist for Light Trucks

**A**NEW hydraulic hand hoist for light trucks which lifts the load by oil pressure has recently been announced by the Wood Hydraulic Hoist & Body Co., Detroit, Mich. This hoist operates on the hydraulic principle, with a

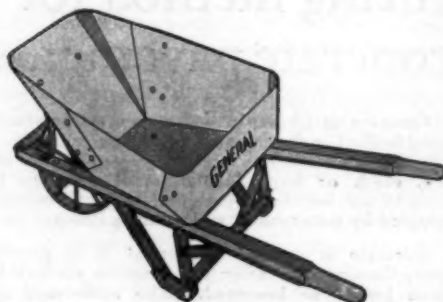


*A Dump Body Operated by the Wood Hydraulic Hand Hoist*

rotary gear type oil pressure pump to supply the pressure. Power is applied to the oil pump by a hand crank on the right-hand side of the chassis. The action of the pump is simple. Oil under pressure is pumped into the cylinder, forcing the piston and piston rod outward. The piston rod outer end is fastened directly to the underside of the body.

The load is raised and supported on a solid cushion of oil. When the crank is stopped, the body remains stationary in an elevated position without the use of catches, ratchets, brakes or such mechanism. To lower, the control valve is placed at "down position" and the body descends. The fixed hinging point insures sufficient ground clearance when the body is in dumping position. A simple-operating tailgate manual set is provided with the control handle on the right side of the body at the front. The body sub-frame is of structural steel, welded to the floor of the body and properly braced.

The new hydraulic hand hoist unit, weighing 850 and 900 pounds complete comes in 1 and 1 1/2-cubic yard capacities. The pump body is nickel-iron, pump gears are steel cut, pump valve is brass and the hoist sub-frame structural steel, electrically welded throughout. The body comes in 6 foot 6 inch and 7-foot lengths, with a width of 5 feet, constructed of 10-gage high-resistant sheet steel and welded throughout. Fittings are malleable castings and the tailgate is double acting.



*The New General Measuring Tray Wheelbarrow*

## A New Measuring Tray Wheelbarrow

**O**N many construction jobs there are narrow places, sharp corners and unusual requirements where a narrow sharp corners and unusual requirements where a narrow General Wheelbarrow Co., 3140 East 55th Street, Cleveland, Ohio, has recently put on the market a wheelbarrow designed to meet such a need. These wheelbarrows have a narrow-nose tray especially adapted to charging mixers and pouring concrete.

The back and sides of the measuring trays are vertical in order to prevent spillage. The narrow nose concentrates the flow of materials and places them where they are wanted. The measuring trays are made in 2, 2 1/2, 3, 3 1/2 and 4 cubic foot level capacities. They are interchangeable on either standard wood or steel tubular frames.

## Highways for Holland

**H**OLLAND is a tiny country, about 200 miles long and 100 miles wide and a population of about 8,000,000 people. The number of automobiles registered is less than 100,000.

Yet plans were recently made in Holland for a system of fast motor roads, radiating from Amsterdam, Rotterdam and the Hague. The system is expected to cost more than \$80,000,000.

More Miles of Good Roads  
for Less Money where  
**BURCH SPREADERS**

are Used for Building  
High Grade Macadam Roads.

Get our booklet for details

**THE BURCH CORPORATION**

**Crestline, Ohio**




**ELECTRIC WHEEL COMPANY**

Designers and makers of complete mounting equipment for America's leading manufacturers of portable machinery. Wheels, trucks, trailers, crawlers, and parts built for individual requirements.

*Catalogs on request*

**Department CM., QUINCY, ILL.**




The three operations, illustrated here, show how easy it is to move earth with a SCHAEFER One-Man Automatic Tractor Scraper.

Write for our circular

4180 LORAIN AVE.

**Schaefer**  
**CLEVELAND**

**ONE-MAN TRACTOR SCRAPER**

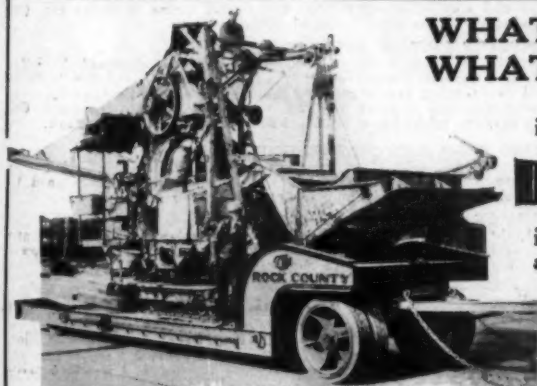


Only one man is needed to work this Scraper, and the operating levers are within his easy reach.

Made in 4-, 5-, 6- and 7-foot Scraper widths. A size for every tractor.

**The Gustav Schaefer Company**

**CLEVELAND, OHIO**



**WHAT Do You Have to Move?**  
**WHAT Is Your Line of Business?**

If you are a contractor and will furnish the above information we will advise just which

**ROGERS TRAILER**

is adapted for handling your work with satisfaction and a definite saving.

If you are a moving contractor we'll show you how to establish in a most satisfactory business free from cut-throat competition and capable of paying a very nice profit.

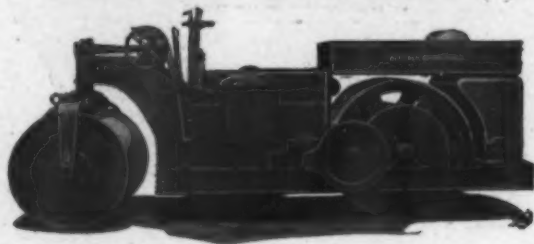
Write for Catalog 28

**ROGERS BROTHERS CORPORATION**

**108 ORCHARD ST.  
ALBION, PENNA.**



## There Are Always SOUND REASONS



### for Buffalo-Springfield Supremacy

Which reasons are to be found in the many years of specialized experience back of the men who design and build them—in the up-to-dateness of design of the various models—and in their adaptability to road construction requirements.

Steam- and motor-driven rollers in all practical sizes. Scarifiers and other special attachments optional.

Write for illustrated booklet describing the Buffalo-Springfield line



THE  
BUFFALO-SPRINGFIELD  
ROLLER CO.  
SPRINGFIELD, OHIO

**BUFFALO-SPRINGFIELD  
ROAD ROLLERS**

## SUPER-HEAT-RESISTING VALVES

Try these valves  
on your toughest  
valve jobs.

They'll last longer  
and give better  
engine performance  
with fewer regrinds,  
because they  
defy distortion  
and destruction  
by heat.



VULCAN  
S H R

VALVE

Used the past  
ten years on diesel  
and gas engines,  
and are now available  
for popular makes of  
contractors engines.

Our engineers  
will gladly help  
solve your valve  
problems. Send  
us a line.

**INDUSTRIAL ENGINE PARTS, INC.**

1053 East Sixty-first Street  
Cleveland, Ohio

## A SELECTED LIST of USEFUL MATERIAL

These especially selected catalogs and pamphlets  
of value to contractors are for free distribution.  
You will find it worth while to check these lists  
each month and write for the catalogs you need.

### A FOLDING STEEL HORSE

The Toledo Pressed Steel Co. (Lyman W. Close, Vice-Pres.), Toledo, Ohio, will be glad to send to those interested a complete description of the Toledo steel horse which consists of two rigid steel frames between which is placed a piece of any 2-inch standard sized lumber and locked in position.

### A 12-FOOT LEANING WHEEL GRADER

Bulletin 1075 of the Austin-Western Road Machinery Co. (H. F. Barrows, Adv. Mgr.), 400 North Michigan Avenue, Chicago, Ill., contains a complete description of the Austin Mammoth Senior 12-foot leaning wheel grader, the features of which include a two-piece telescopic rear axle, disc wheels, an improved offset engine hitch, particularly strong gooseneck and circle assembly and scarifier attachment.

### NEW STEEL ROOFING

A booklet describing Ferrobor, a new steel roof deck in 6-inch wide units to be used for any desired amount of insulation and for waterproofing which presents a smooth unbroken surface, may be secured from the Truscon Steel Co. (Oscar W. Loew, Dir., Adv. and Sales Promotion), Youngstown, Ohio.

### HAIRPIN CLIP MACHINE

The new Steelcrete hairpin clip machine has been designed by the Consolidated Expanded Metal Companies (Thos. R. Herbert, Jr., Vice-Pres.), Wheeling, W. Va., to enable a lather to make his own hairpin clips and ceiling hangers right on the job. It is described in a folder issued by this company.

### A NEW SIX AIR COMPRESSOR

The Thor Six air compressor which is equipped with a super-charger and is made in two sizes of 116-foot rated capacity and 250-foot rated capacity, is manufactured by the Independent Pneumatic Tool Co. (F. R. Pfaff, Adv. Mgr.), 248 South Jefferson Street, Chicago, Ill.

### CENTRIFUGAL SELF-PRIMING PUMPS

Bulletin 29-C describing LaBour centrifugal self-priming pumps which come in a range of sizes for portable or stationary installations may be secured from the LaBour Co. (H. E. LaBour, Pres.), Elkhart, Ind.

### A COMPLETE LINE OF PAVING AND CONSTRUCTION EQUIPMENT

A complete line of paving and construction equipment, including subgraders, finishing machines, road forms, batch boxes and cars, mixers, chuting equipment, buckets, concrete carts and others, is described in bulletins which may be secured from the Lakewood Engineering Co. (Lion Gardiner, Vice-Pres.), Cleveland, Ohio.

### A SPEEDY PIPE CUTTER

The Ellis pipe cutter which has six rotary blades and can be used on all kinds of pipe up to 12 inches in diameter is described in a circular which the Ellis & Ford Manufacturing Co. (Herman A. Sperlich, Pres.), 32 Piquette Avenue, Detroit, Mich., will send on request.

### TRACK-WHEEL WAGONS

Euclid track-wheel wagons which follow in the track of a tractor and can go anywhere that the shovel or tractor goes are described in a new catalog which also contains many interesting facts on earth haulage and may be secured from the Euclid Crane & Hoist Co. (A. P. Armington, Sales Mgr.), Euclid, Ohio.

### A COMPLETE LINE OF BUCKETS

Complete information in regard to the line of Hayward buckets, including clamshell, orange peel, dragline and electric motor buckets as well as dredging and excavating machinery, automatic take-up reels and counterweight drums, may be secured from the Hayward Co. (H. C. Ryder, Asst. Sales Mgr.), 32-36 Day Street, New York.

### ENGINES FROM 3 TO 160-HORSEPOWER

The LeRoi Co. (W. R. Karll, Sales Mgr.), Milwaukee, Wis., will be glad to send to those interested complete information in regard to the LeRoi engine, ranging in size from 3 to 160 horsepower.

### EXPANSION JOINTS FOR CONCRETE

Sealtight expansion joints for the protection of concrete are described in literature which W. R. Meadows, Inc. (W. R. Meadows, Pres.), Elgin, Ill., will send to those interested.

### A NEW TRAILER MIXER

The Lansing Co. (S. E. Race, Sales Mgr.), Lansing, Mich., will send to those interested complete information in regard to the new Lansing 3½-T trailer mixer, among the features of which are cushion tires, spring shock absorbers, extra large mixing drum with four steel mixing blades, Hyatt bearings and Alemite fittings and powered with a Lanson 2-horsepower engine with Wico high tension magneto.



## Culvert History Proves that Pure Iron *means* Durability

Points to consider in selecting  
culverts and drains: No 4\*

**O**FFICIALS responsible for culvert selection are wisely giving attention to the history of culverts, particularly corrugated iron culverts.

Culvert history brings out, in a long list of convincing examples, that *in underground service* pure iron means Durability.

Armco Ingot Iron, used in Armco Culverts and Pipe, is held to this standard, because pure iron has consistently demonstrated its sturdy resistance to rust and erosion in the test of years.

And the test of years is the only authentic and generally accepted test. For, as

stated in a report made by a committee of the Institution of Civil Engineers (British) "... no reliable acceleration test has yet been discovered. The only satisfactory method lies in exposing the metals to corroding influences under conditions precisely similar to those to which the metals would be exposed."

We illustrate on this page a few of the many thousands of examples of Armco Ingot Iron endurance. We shall be glad to supply further facts on request to those who have in hand the selection of permanent culverts.



Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

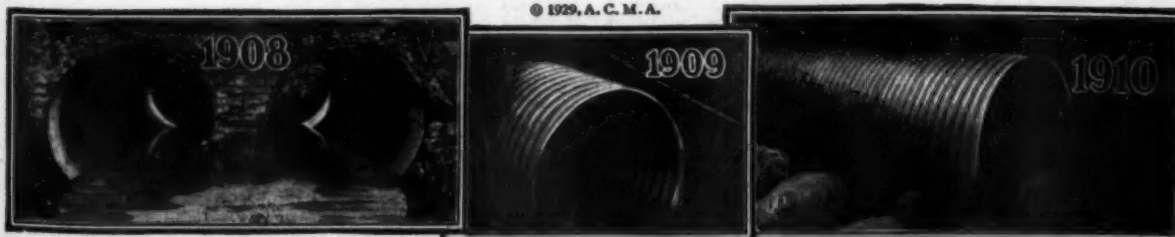
\*No. 5 of this series  
appears in October

ARMCO CULVERT MANUFACTURERS ASSOCIATION  
MIDDLETOWN, OHIO

# ARMCO CULVERTS

"Look under your Roads"

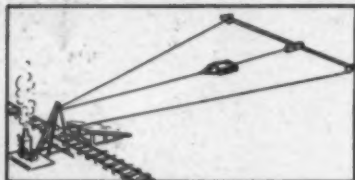
© 1929, A. C. M. A.



When writing advertisers please mention the CONTRACTORS AND ENGINEERS MONTHLY—Thank You.

## THE CONTRACTOR'S FRIEND

Moves dirt when you want it and places it where you want it. Also, cleans lakes and builds dams.



### SCHOFIELD-BURKETT CONSTRUCTION CO.

Macon, Georgia

Manufacturers of Cable Drag Line Equipment  
Eastern Office: 150-02 Sixth Avenue, WHITESTONE, N. Y.



## The UNION No. 9 MIDGET HAMMER

Designed to come within the weight range of the pavement breaker and the rock drill type of hammer, and at the same time do more work with less air consumption.

Weights 97 pounds, delivers over 250 blows per minute and strikes a 275-pound blow.

Send for copy of new catalog No. 124 on "Pile Driving Machinery and Foundation Equipment"

### UNION IRON WORKS

Builders of Double Acting Pile Hammers Since 1906  
West Shore Siding Hoboken, N. J.

THE SANDERSON CYCLONE DRILL CO., ORRVILLE, OHIO



**DRILLS**  
and drill tools  
for every kind of  
Big Blast Hole Drilling

Catalog Mailed on Request

## "TEN TIMES MORE LIGHT"



"Ten times more light than an oil lantern, and at less cost"—

This remark by a railroad man explains why thousands of National Carbide Lanterns are being used today by contractors, miners, tunnel workmen, street repair crews, and others who want a dependable, strong, clear and penetrating light.

### NATIONAL CARBIDE SALES CORP.

342 MADISON AVE., NEW YORK

## A SELECTED LIST OF USEFUL MATERIAL

### PUNCHES, DIES AND RIVET SETS

Catalog No. 9 describing the punches, dies, rivet sets, chipping chisels and special tools manufactured by the Cleveland Steel Tool Co. (R. J. Venning, Treas.), 660 East 82nd Street, Cleveland, Ohio, may be secured on request.

### AN OIL BURNING KETTLE

The Connery Blue Book containing a complete description of the Connery line, including the Style J oil burning kettle which is quick heating, is equipped with roller bearing wheels and springs, temperature control and solid rubber tires if desired, may be secured from Connery & Co., Inc. (W. B. Roberts, Asst. Secy.), 4000 N. Second Street, Philadelphia, Pa.

### STEEL BARRICADE SUPPORTS

The Cleveland Steel Specialty Corp. (D. B. Ewing, Treas.), 6602 Park Avenue, Cleveland, Ohio, will be glad to send to those interested complete information in regard to the Cleveland steel barricade supports for a 2 by 6 stringer, which are ruggedly constructed, self-locking, easily assembled or dismantled by one man and are heavy enough to withstand high wind pressure.

### CALCIUM CHLORIDE FOR DUST PREVENTION

A booklet describing the 3-C calcium chloride, the use of which insures clean and dustless roads, may be secured from the Columbia Products Co. (Henry W. Young, Vice Pres.), Barberton, Ohio.

### A CABLE DRAGLINE EXCAVATOR

Information in regard to the Schofield-Burkett cable dragline excavator may be secured by those interested from Schofield-Burkett Construction Co. (J. Newton Barnes, Pres.), Macon, Ga.

### ASPHALT ROAD BINDER

Specifications and information in regard to the Standard asphalt road binders for surface treatment, for penetration work and for the mixing method, joint fillers for brick or block pavements, cold patch asphalt for repairing all types of bituminous road surfaces, asphalt for sheet asphalt paving and paving flux and preserving oils, may be secured on request from the Standard Oil Co. of New York (J. S. Helm, Mgr., Asphalt Sales), 26 Broadway, New York.

### A NEW SAW RIG

The new Home Builder's saw rig and also the No. 18-A saw rig with the new Texrope drive and all steel welded frame and steel table top, is described in literature which may be secured from the C. H. & E. Manufacturing Co., Inc., 250 Mineral Street, Milwaukee, Wis.

### A TRACTOR ONE-MAN GRADER COMBINATION

A complete description of the new unit made up of a Trackson tractor and a Wehr one-man grader which provide traction and sure footing for very difficult jobs, may be secured from the Trackson Co. (L. E. Dauer, Sales Mgr.), 519 Clinton Street, Milwaukee, Wis.

### A NEW TYPE OF GOVERNOR

A folder describing the new type of Pickering governor suitable for use on the 15-27 horsepower John Deere tractors which have recently been developed may be secured from the Pickering Governor Co. (George C. Pascall, Secy.), Portland, Conn.

### A NEW PROPORTIONING AND MIXING UNIT FOR WEIGHING AGGREGATES

The new mixer attachment known as the Smith Weigh-Mix which is designed for use with the Smith mixer to proportion all materials by weight and thoroughly mix them is described in literature which the T. L. Smith Co. (G. W. Pollock, Sales Mgr.), Milwaukee, Wis., will be glad to send on request.

### A COMPLETE LINE OF GRAVEL EQUIPMENT

An 80-page booklet describing the complete line of Pioneer gravel equipment, including a variety of screening, loading and crushing plants, belt conveyors, feeders, shaker and revolving screens, draglines, bins, crushers, bucket elevators and accessories, may be secured from the Pioneer Gravel Equipment Co. (K. E. Brunsdale, Treas.), Minneapolis, Minn.

### RIGID ROAD RAILS

Metal Forms Corp., 1436 Booth Street, Milwaukee, Wis., will be glad to send to those interested its booklet describing the Metalform rigid road rails which are made of No. 10 gage steel, lapped and riveted, and are designed to resist battering and weight without denting or crushing.

### A ROAD ROLLER WITH MANY NEW FEATURES

The Good Roads Senior roller, having a number of new and important features and equipped with an air scarifier if desired, is described in a 4-page bulletin which may be secured from the Good Roads Machinery Co. (J. Warren Kitts, Adv. Mgr.), Kennett Square, Pa.

### STEEL SHEET PILING

Wemlinger, Inc. (J. R. Wemlinger, Pres.), 149 Broadway, New York, will be glad to send to those interested complete information in regard to its steel sheet piling for construction service.

### ALL STEEL DUMP BODIES

Catalog No. 10 describing Wood all steel dump bodies, which are reinforced at all points where the greatest stress comes and vital parts are of drop forged steel, may be secured from the Wood Hydraulic Hoist & Body Co. (Frank H. Dorey, Gen. Mgr.), Detroit, Mich.

### A NEW HIGHWAY MAINTAINER

A new type of two-lever drag maintainer, known as the General Planetainer, which combines the leveling principle of the drag with the cutting action of the road patrol or maintainer, is described in literature which may be secured from the General Wheelbarrow Co. (W. A. Gordon, Sales Mgr.), 3140 East 65th Street, Cleveland, Ohio.



## Two Ways To Cure Your Concrete Curing Troubles



**U**SE Solvay Calcium Chloride as an integral part of the mix and you have the simplest, fastest, and most economical of modern concrete curing methods. The use of a simple mixing device, which can be easily attached to any standard concrete mixer, makes this method practically automatic.

Or you can apply Solvay Calcium Chloride with a Solvay Hand Spreader and make surface curing a one-man job.

The need for constant sprinkling and inspection is eliminated when Solvay Calcium Chloride is used as the curing agent. Curing is effected uniformly throughout the mass and strength is gained early enough to permit opening to traffic in half the usual time.

*Write today for free 24-page Concrete Curing Booklet No. 2051*

# **SOLVAY**

## **Calcium Chloride**

**Flake 77%-80%**

Manufactured under United States Patents No. 1,527,121 and No. 1,592,971

**SOLVAY SALES CORPORATION, 40 Rector Street, New York**

*Alkalies and Chemical Products Manufactured by The Solvay Process Company*

**THE IDEAL CONCRETE CURING AGENT AND ACCELERATOR**

# STEEL SHEET PILING

Bought. Sold. Rented.

## WEMLINGER INC.

Service. Technical advice. Stocks on hand everywhere.

149 BROADWAY NEW YORK

### SPEED UP WORK BY USING



a Connery Style oil-burning kettle. Here's a kettle that answers all requirements—low fuel cost, quick heating, roller-bearing wheels and springs, absolute temperature control and solid rubber tires if desired.

We manufacture a full line of Tar and Asphalt Kettles, Oil Burning Kettles, Oil Burners, Torches, Fearing Pots, Hand Spraying Attachments, etc. Send for "Blue Book" describing our equipment.

**Connery & Company, Inc.**

4000 N. Second Street, Philadelphia, Pa.

### Hayward Buckets



Let Hayward Engineers recommend a bucket to fit the job. The Hayward line includes Clam Shell, Orange Peel, Drag Line and Electric Motor Buckets; Dredging, Excavating and Coal Handling Machinery; Automatic Take-up Reels; Counter-weight Drums.

**THE HAYWARD COMPANY**

32-36 Day Street

New York, N. Y.

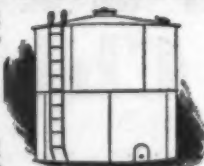
### BOLTED TANKS & WELDED TANKS

For Oil, Water, Brine, and Various Liquid & Dry Commodities.

Shipped K. D. in sections and bolted together with special gasket and cement, making tight and impervious joints.

In case of removal, easily disassembled and re-erected. Capacities to a million gallons and larger. Write for our folder, "Bolted Tanks in Industry."

**COLUMBIAN STEEL TANK CO.**  
KANSAS CITY, MO. ESTABLISHED 1893



## A SELECTED LIST OF USEFUL MATERIAL

#### AN EXCAVATOR FOR MANY USES

The 1/2-yard General shovel-clamshell-backhoe-dragline-skimmer-crane-backfiller which may be used for a variety of purposes, is fully convertible from one to the other without changes or additions to the operating machinery and is sturdy and dependable. Is described in literature which may be secured from the General Excavator Co. (F. B. Morrison, Sales Mgr.), 200-274 Rose Street, Marion, Ohio.

#### AUTOMATIC ROAD PUMP HAS MANY FEATURES

The many features of the Rex automatic road pump built to supply water to the paver under the most adverse conditions are described in Bulletin 179 of the Chain Belt Co. (R. A. Shilbauer, Asst. Adv. Mgr.), 766 Park Street, Milwaukee, Wis.

#### SIGNAL LIGHTS FOR ROADSIDE WORK

R. E. Dietz Co., 80 Lighthouse St., New York, will be glad to send to those interested complete information in regard to Dietz Red Globe lanterns of the hot blast type for roadside warning signals.

#### A COMPLETE LINE OF HOISTING EQUIPMENT

A catalog describing the Mundy steam, gas and electric hoists, dredge hoists, belt hoists, ship, cargo and dock winches, capstans and cableways will be sent on request by the J. S. Mundy Hoisting Engine Co., 722-40 Frelinghuysen Ave., Newark, N. J.

#### A POWER DUMP MOUNTED ON TRACTOR

The Winsor Co. (Roy Winsor, Pres.), Bucyrus, Ohio, will be glad to send to those interested a copy of its bulletin describing its Model 24 power dump mounted on an 10-20 Industrial McCormick-Deering tractor which has a capacity of 4 to 5 yards.

#### A SWIVEL HOOK HOISTING BLOCK

A catalog describing the Dobbie swivel hook hoisting block with detachable cheek weights for use with a truck crane or derrick, as well as the entire Dobbie line of derrick fittings, ball and roller bearing sheave blocks and hand winches, may be secured from the Dobbie Foundry & Machine Co., Niagara Falls, N. Y.

#### TRACTOR POWER IN INDUSTRY

This is the title of a booklet describing McCormick-Deering tractors and their many uses which may be secured from the International Harvester Co. of America, 606 South Michigan Avenue, Chicago, Ill.

#### DOUBLE-ACTING PILE HAMMERS

Bulletin 37 describing McKiernan-Terry double-acting pile hammers for driving concrete piles may be secured by any one interested from the McKiernan-Terry Drill Co. (C. S. Ackley, Secy.), 19 Park Row, New York.

#### HOW TO CURE CONCRETE

This is the title of a booklet describing Dowflake calcium chloride and its uses as a curing agent and accelerator which the Dow Chemical Co. (Donald Williams, Asst. Sales Mgr.), Midland, Mich., will be glad to send to those interested.

#### REINFORCED CONCRETE PIPE

Complete information in regard to Newark reinforced concrete pipe which is easily laid and maintains a perfect flow line may be secured from the Newark Concrete Pipe Co. (F. H. Sherrard, Gen. Mgr.), 462 Broad Street, Newark, N. J.

#### A COMPLETE LINE OF TRENCHERS AND BACKFILLERS

The Parsons Co. (N. DeWind, Gen. Sales Mgr.), Newton, Iowa, will be glad to send to those interested a complete description of the Parsons 40 digger as well as of the remainder of the complete Parsons line of trenchers and backfillers.

#### TANDEM ROLLERS

The Barber Asphalt Co. (W. F. Hartzell, Adv. Mgr.), 1600 Arch St., Philadelphia, Pa., will be pleased to send to interested highway officials, highway engineers and contractors copies of its 16-page Bulletin No. 1A, which describes Iroquois tandem rollers, giving a list of repair parts and directions for operation and maintenance.

#### A NEW HEAVY-DUTY CRAWLER LOADER

The N. P. Nelson Iron Works, Inc., 825 Bloomfield Ave., Passaic, N. J., will be glad to send to those interested complete information in regard to the new Nelson Q-7 crawler loader which has a full 2-yard elevating capacity, extra long ground-gripping crawlers, a discharge height of 9 1/2 feet and is powered by a McCormick 10/20 tractor.

#### TRUCKS FOR CONTRACTORS

A complete description of the line of White trucks including a model for every need, may be secured by any one interested by writing to the White Co. (Stanley P. Seward, Adv. Mgr.), Cleveland, Ohio.

#### WIRE ROPE FOR SAFETY

Williamsport Wire Rope Co. (C. M. Ballard, Sales Mgr.), Peoples Gas Bldg., Chicago, Ill., will be glad to send on request complete information in regard to Williamsport Telfax Tape marked wire rope which proves every grade made and makes for safety.

#### GASOLINE ENGINE RENEWAL VALVES

Industrial Engine Parts, Inc., 1053 East 61st Street, Cleveland, Ohio, has developed the Vulcan super-heat-resisting valve for motors used in construction work which is designed and treated so that it is not distorted or corroded by heat in gasoline, kerosene or diesel engines under the terrific pressures created in these engines under severe service.

#### LOADERS AND SPREADERS

A catalog containing a full description of Burch spreaders, loaders and other road equipment may be secured by those interested from the Burch Corp. (C. R. Beaver, Sales Mgr.), Crestline, Ohio.

# Where's *everybody* going?



**E**VEN now there are 47 automobiles for every mile of improved road. This year will add 5,000,000 new cars to the existing 25,000,000.

How is this scurrying, swarming pack ever to be accommodated? What must highway officials do to avert a congestion that will render every automobile less useful—every motor trip longer?

Two facts are self-evident:

- (1) The more that roads cost, the longer it will take to get them.
- (2) The country cannot answer its problem entirely with expensive types of construction.

States, counties and towns are working it out with Tarvia "Re-Tread" programs permitting the use of local materials for every road-building, widening or rejuvenating project. Tarvia "Re-Tread" makes it possible for any community to have smooth, durable, skid-safe, storm-proof roads—quickly and without excessive taxation.

## The *Barrett* Company

New York	Chicago	Philadelphia
St. Louis	Minneapolis	Boston
Detroit	Cleveland	Birmingham
Buffalo	Kansas City	Columbus
Providence	Syracuse	Milwaukee
Baltimore	Toledo	Cincinnati
Lebanon	Youngstown	Rochester
		Bethlehem

### In Canada:

THE BARRETT COMPANY, Ltd.  
Montreal, Toronto, Winnipeg, Vancouver

# Tarvia "RE-TREAD"

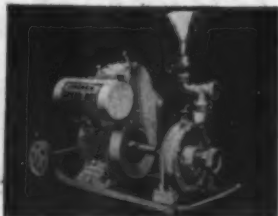
TRADE MARK REG. U. S. PAT. OFF.



## 8000 Gallon SPEED BOY PUMP...\$167.50 (F.O.B. Factory) Add Freight

Handles 25% to 28% Solids . . . One Man Trails It Around . . .

Built by builders of Jaeger Mixers. Non-clogging brass impeller, 2 h.p. Briggs & Stratton engine, foot starter, foot valve, easy primer. A real "buy"!



Send for Pump Catalog and Prices  
**THE JAEGER MACHINE COMPANY**  
701 Dublin Ave., Columbus, Ohio

## Simplex Jacks

for Industries-Utilities-Railways-  
Oil Wells-Mines-Engineering Contractors

Simplex Lever Jacks-Pipe Pushers-Trench Braces  
Simplex Screw Jacks-with the Visible Screw

Distinctive in Man Power, Safety & Simplicity

Templeton, Kenly & Co., Chicago, U.S.A.

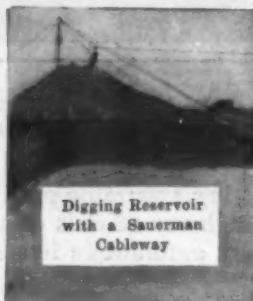
The World's Largest Manufacturers of Jacks  
Baldwin Locomotive Works, Foreign Representative



Simplex  
Screw Jack  
with the  
Visible Screw

## Long-Distance Digging Simplified

SAUERMAN Slackline Cableways can reduce your payroll—can cut overhead charges—can save you a lot of equipment expense—whenever you have an excavating job where the material has to be moved any distance from 200 to 1,000 feet or more. Write for new 56-page catalog and see for yourself how hundreds of excavating problems can be simplified.



Digging Reservoir  
with a Sauerman  
Cableway

SAUERMAN BROS., Inc., 464 S. Clinton St., Chicago



**HIGH QUALITY  
LOW COST**

**STERLING HOISTS**

Equipped with  
TIMKEN ROLLER  
THRUST BEARINGS  
JOHNS-MANVILLE  
ASBESTOS FRICTIONS  
ALENITE-ZERK  
LUBRICATION  
GROUND PRECISION  
SHAFTING  
AND  
IMPROVED SCREW THRUST

Ask for  
Bulletin A

Manufactured By  
**STERLING MACHINERY CORPORATION**  
2308-7 Holmes St.  
Kansas City, Mo.

## A SELECTED LIST OF USEFUL MATERIAL

### STRENGTH AND POWER IN TRACTORS

Literature and prices on Allis-Chalmers-Monarch tractors which are designed for strength and power in road building may be secured from Allis-Chalmers Mfg. Co., Road Machinery Div., Springfield, Ill.

### A ROAD GRADER WITH LOW CENTER OF GRAVITY

Footo Bros. Gear & Machine Co., 111 N. Canal Street, Chicago, Ill., will be glad to send to those interested complete information in regard to the new Stockland grader, among the features of which are the low center of gravity, plenty of blade clearances, the cut, lift, roll, curved blade, the location of the blade, the extra heavy wheelbase, three point suspension, fewer working parts and heavy frame construction.

### TWO NEW MOTOR PATROLS

A complete description of two new motor patrols, the Russell Ten and Fifteen, the principle feature of which is the blade-lift mechanism, may be secured from the Road Machinery Division of the Caterpillar Tractor Co. (W. H. Gardner, Adv. Mgr.), San Leandro, Calif.

### A 3/4-YARD FULL REVOLVING SHOVEL

Catalog No. 629, containing a complete description of the new Byers 3/4-yard full revolving shovel-crane-dragline-trencher and skimmer which is equipped with the Byers direct drive and the independent cable crowd, may be secured on request from the Byers Machine Co., Ravenna, Ohio.

### A CONCRETE TAMPER FOR BETTER CONCRETE WORK

A catalog describing the entire line of heavy steel goods or industrial tools, including the True Temper concrete tamper for bringing fine concrete to the form and insuring a better surface, may be secured from the American Fork & Hoe Co. (S. S. Chapin, Secy.), 1987 Keith Bldg., Cleveland, Ohio.

### A CONTRACTORS' HOIST

Bulletin A containing a description of the Sterling hoist which is equipped with Timken roller thrust bearings, Johns-Manville asbestos frictions, Alemite-Zerk lubrication, ground precision shafting and an improved screw thrust, will be sent on request by the Sterling Machinery Co. (R. G. Barzen, Secy. & Treas.), 2303-7 Holmes Street, Kansas City, Mo.

### A COMPLETE LINE OF CONCRETE MACHINERY

Information in regard to the complete Ransome line of concrete machinery including tilting and non-tilting mixers, pavers, and towers may be secured from the Ransome Concrete Machinery Co. (A. P. Robinson, Sales Mgr.), Dunellen, N. J.

### A REVOLVING TRACTOR SCRAPER

The Groundhog revolving tractor scraper which is made in three sizes, loads and spreads or dumps continuously under forward draft with the depth of the cut under instant control is described in literature which the Roderick Loan Co. (Frank H. Smith, Sales Mgr.), Dept. 9, Mansfield, Ohio, will send on request.

### FLOOD LIGHTS FOR CONSTRUCTION JOBS

Carbide flood lights which penetrate fog, dust or smoke, and which are inexpensive to operate, portable and rugged are described in literature which the Oxweld Acetylene Co. (T. C. Fetherston, Mgr., Technical Publicity Dept.), Carbide and Carbon Bldg., New York, will be glad to send on request.

### A ONE-MAN TRACTOR SCRAPER

The Gustav Schaefer Co. (Ernest Schaefer, Secy.), 4180 Lorain Avenue, Cleveland, Ohio, will furnish on request complete information in regard to the Schaefer one-man tractor scraper which is made in four scraper widths of 4, 5, 6 and 7 feet and on which all operations of loading and dumping, spreading and leveling, are controlled from the driver's seat.

### A NON-CLOGGING PORTABLE PUMP

Bulletin R-29 describing a non-clogging portable pump, the Speed Boy, which can easily be moved from one place to another by one man, may be secured from the Jaeger Machine Co., 701 Dublin Avenue, Columbus, Ohio.

### A COMPLETE LINE OF MIXERS, PAVERS AND HOISTS

A catalog describing the complete line of Boss mixers, pavers and hoists in over 79 sizes, combinations and types for all contracting uses may be secured by those interested from the American Cement Machine Co., 238 S. Fourth Street, Keokuk, Iowa.

### A NEW HORIZONTAL-TYPE ENCLOSED ENGINE

Stover Mfg. & Engine Co. (Lee Madden, Vice-Pres.), 25 Lake Street, Freeport, Ill., will be glad to send to those interested literature describing the new horizontal-type completely enclosed Stover engine.

### A CLUTCH FOR MANY USES

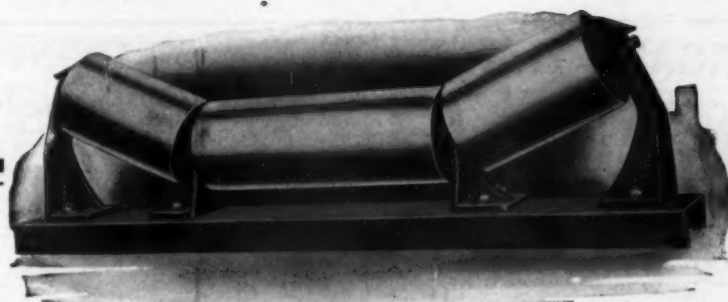
Complete information in regard to the Twin Disc clutch which has many uses on a variety of industrial machines and equipment may be secured by those interested from the Twin Disc Clutch Co. (P. H. Batton, Pres.), Racine, Wis.

### PORTABLE BELT CONVEYORS

Atlas Engineering Co. (C. W. Zimmerman, Vice-Pres.), Box N. Clintonville, Wis., will be glad to send to those interested a complete description of Atlas portable belt conveyors, which are powered by either a gasoline engine or electric motor, are made in lengths of from 15 to 100 feet with belt 14, 16, 18 or 24 inches wide, and are suitable for moving or piling material.

### A SELF-LOADING SCRAPER

Bulletin No. 263, containing a complete description of Baker-Maney self-loading scrapers in three sizes, 3/4, 1 and 1 1/2-cubic yard capacities to suit the job, may be secured from the Baker Manufacturing Co. (L. A. Ginsel, Secy.), 585 Stanford Avenue, Springfield, Ill.



## THESE ARE SUPER-CONWEIGH THREE-PULLEY TROUGHING IDLERS WITH OUTBOARD BRACKETS

We were the designers and builders of the conveyors used for constructing the concrete anchorage on the New York side of the Hudson River Bridge, which is to have a span twice as long as that of any other bridge in the world.

The idlers illustrated have malleable iron outboard brackets; Alemite lubrication. They are equipped with either Timken roller bearings or S. R. B. ball bearings.

*We are the original designers and builders of ball bearing idlers.*

**THE CONVEYING WEIGHER COMPANY**  
90 WEST STREET NEW YORK

Agents:  
Wells Fargo & Co. Express, S. A., Mexico, D. F.

## *The mighty midget does its stuff...*

See the little Homelite Self Priming Portable Centrifugal Pump. A pint a minute if that's all there is or, 6000 gal. per hour. Weighs less than 100 lbs. complete with built-in air cooled gasoline engine—yet stands heavy service for years. It's built to labor and to last.

A distributor near you will demonstrate on your job. Ask us for his name and address.

### **HOMELITE Self Priming**

### **PORTABLE CENTRIFUGAL PUMP**

HOMELITE  
CORPORATION

71 Riverdale Avenue,  
Port Chester, N. Y.

Ⓢ 3749



## INVESTIGATE THE **O-K** PORTABLE ELEVATOR



THE "last word" in a portable hoisting elevator for Contractors, Builders, Bricklayers and Plasters.

The illustration shows the elevator platform partly raised. TWO men can easily erect this all-steel O. K. Portable Elevator to a 26-foot height, ready for hoisting, in two hours. Additional 10-foot sections can be very quickly added when needed.

Write for illustrated catalog of our full line of O. K. Air Compressors and Hoists.

**O. K. CLUTCH & MACHINERY CO.**  
Builders of good machinery since 1904  
Columbia, Pa.

## Turbine Air Concrete Surfacers Did this Job



D. L. & W. R. R. Viaduct—Brick Church,  
East Orange, New Jersey

One of the many bridges smoothed and finished by Turbine Air Concrete Surfacers.

Write for Information on Surfacing Machines  
for All Kinds of Work

**THE TOUSLEY TOOL CO.**  
1965 East 66th Street, N. E. Cleveland, Ohio

## All About Wet Concrete Handling



on such jobs as

Buildings  
Retaining Walls  
Viaducts  
Sewers  
R. R. Elevations  
Elevated Drives  
Irrigation Ditches  
Bridges  
Locks

~ with ~

## B-G Portable Belt Conveyors

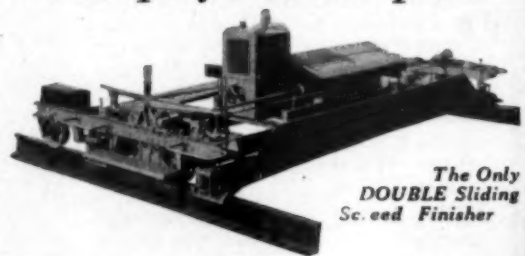
New ideas—new set-ups—for handling wet concrete from the mixer to the forms with B-G Portable Belt Conveyors are detailed in the new wet concrete book—"New Applications and Set-Ups." Send the coupon for your copy.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

**BARBER-GREENE COMPANY**  
485 West Park Ave., Aurora, Ill.



## Pioneering Vision and performance plus



The Only  
**DOUBLE Sliding**  
Screed Finisher

THE complete success of the double-sliding screed has been matched by the super-performance of the **ORD Road-Finishing Machine**.

On the one hand the contractor has the simplest and least expensive method of obtaining the most consistently high-grade finish. On the other, a machine that has in every instance far outlived its normal expectancy of usefulness.

Write today for our completely informative interestingly illustrated bulletin

**A. W. FRENCH & CO.**  
DIVISION OF BLAW-KNOX CO.

Manufacturers of the ORD Concrete Road Finisher  
8524 Vincennes Ave. Chicago, Ill.





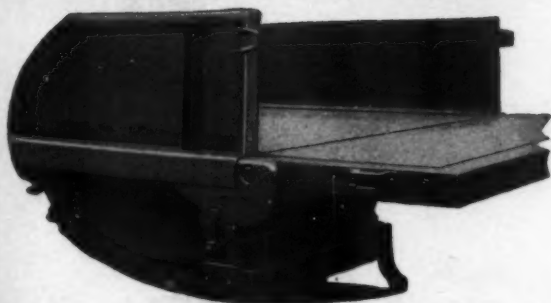
## WHY WOOD HOISTS AND DUMP BODIES?

Because 18 years of practical experience in building dumping equipment for dump truck men has taught us how to built hoists and dump bodies to withstand the most severe service.

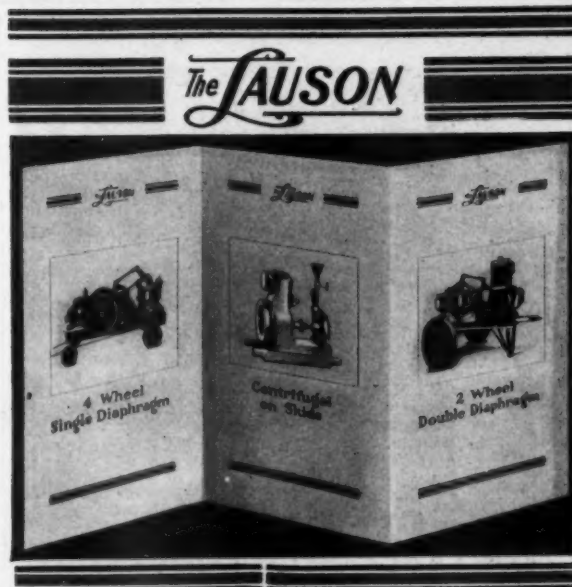
Wood All Steel Dump Bodies are reinforced at all points where greatest stress comes and vital parts are of drop forged steel—assuring solid satisfaction in performance and economy in operation.

Write for latest Catalog No. 10

Wood Hydraulic Hoist & Body Co.  
Detroit U. S. A.



J-1 is a quick operating "all purpose" body. Tail gate and tail gate posts open level with floor, forming platform extension.



For High Grade Equipment  
With Endurance Built Into  
It—Buy "Lausons"

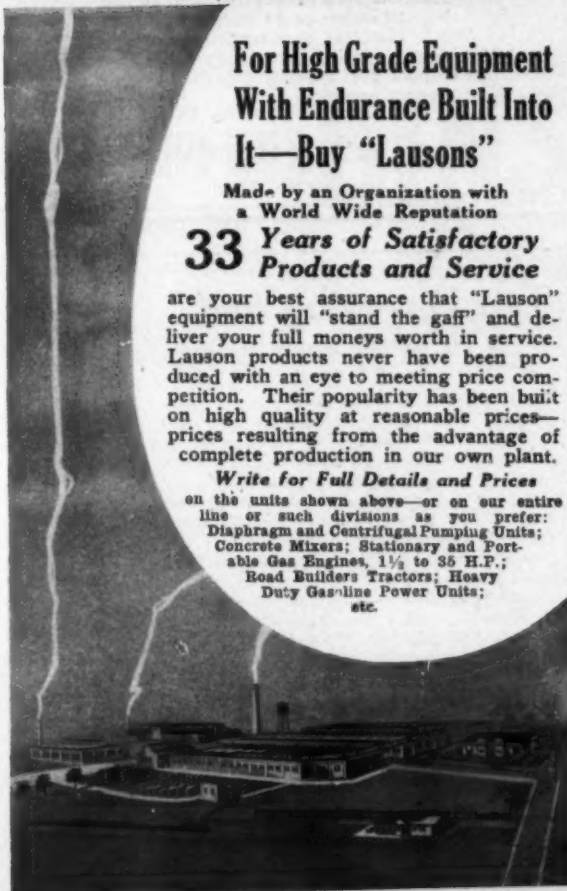
Made by an Organization with  
a World Wide Reputation

**33 Years of Satisfactory  
Products and Service**

are your best assurance that "Lauson" equipment will "stand the gaff" and deliver your full moneys worth in service. Lauson products never have been produced with an eye to meeting price competition. Their popularity has been built on high quality at reasonable prices—prices resulting from the advantage of complete production in our own plant.

Write for Full Details and Prices

on the units shown above—or on our entire line or such divisions as you prefer: Diaphragm and Centrifugal Pumping Units; Concrete Mixers; Stationary and Portable Gas Engines, 1½ to 35 H.P.; Road Builders Tractors; Heavy Duty Gasoline Power Units; etc.



The  
**JOHN LAUSON MFG. COMPANY**  
11 Jackson St., New Holstein, Wis.



## FAIRFIELD PORTABLE BELT CONVEYORS

Manufactured in lengths 20 to 60 feet  
20 inches or 24 inches wide  
Gasoline or electric power  
Maximum capacity assured by wide troughed  
belt without use of side boards to cut belt edges.

Send for Bulletin No. 66-C.E.

**THE FAIRFIELD ENGINEERING CO.**  
Marion, Ohio

## Put DOWFLAKE Right in the Mixer

The use of Dowflake Calcium Chloride as a curing and accelerating agent enables contractors to speed up work with greater efficiency and permits road officials to open up pavements in half the time without sacrificing strength.

Dowflake added to the mix in the form of a solution permeates the entire mix and results in a quick setting, uniformly cured slab. It cuts curing time in half, eliminates ponding, and reduces surface cleavage, voids and pitting.

Send for our  
free book  
"How to Cure  
Concrete."

**THE DOW CHEMICAL COMPANY**  
Midland Michigan  
Branch Sales Offices:  
90 West Street, New York City  
Second and Madison Streets, Saint Louis



## Ten Days Shy and A Job to Finish

IS it possible to complete the job on time? Right now, contractors, engineers and road-builders are confronted with this question.

It can be done with Carbic Flood Lights.

Keep going until completion is assured. Continue operations at night under the powerful, brilliant rays of Carbic Light and speed right along to a timely finish.

Carbic Flood Lights are dependable. They are always ready for service and burn continuously for hours without attention.

Portable and convenient—they provide adequate illumination for any night job. They cost only a few cents an hour to operate.

**Finish Up with Carbic Light**

### OXWELD ACETYLENE CO.

Unit of Union Carbide and Carbon Corp.

NEW YORK **UCC** CHICAGO  
Carbide and Carbon Bldg. Carbide and Carbon Bldg.  
SAN FRANCISCO—Adam Grant Building



Technical Publicity Department, Oxweld Acetylene Co.  
205 East 42nd Street, New York, N. Y.

Without obligation, I would like to have additional information on Carbic Lights.

Name.....

Street Address.....

City.....State.....

1 2 3 4 5 6 7 8

## PROFIT ON SHORT HAUL?



Yes, Sir! A train of WARCO Wheeled Scoops and a tractor will move average dirt a distance of 500 feet for from 10 to 15 cents per cubic yard. This includes all costs—operators, gas, oil, depreciation, etc.

WARCO Scoops excavate, transport and spread, all in one operation—and in trains of two or three scoops—one man handles them.



ASK US TO SHOW YOU

**W. A. RIDDELL CO.**  
BUCYRUS OHIO



### THE ONLY BINS BUILT ENTIRELY OF COPPER BEARING STEEL

To produce a bin of the best possible engineering design and enduring qualities, Beaumont Bins are built entirely of copper bearing steel plate. They are the only bins on the market with this feature.

# 9 big features

1. Constructed of copper bearing steel plates which insures the bin lasting two to three times as long as ordinary steel bins.
2. Structurally rigid, properly designed and all bolted construction.
3. Built in standard sizes to answer all possible requirements.
4. Easily portable.
5. Full gravity discharge, no clogging in the bins and at gates.
6. Speeds up material handling.
7. No projecting columns to prevent bins being placed side by side.
8. Ample truck clearance is provided.
9. Easy erection. Shipped in a few parts that are all match-marked and accurate as to hole spacing.

Write for Catalog 100 .

**BEAUMONT MANUFACTURING CO.**  
330 Arch Street  
PHILADELPHIA

2103-E Straus Bldg.  
CHICAGO

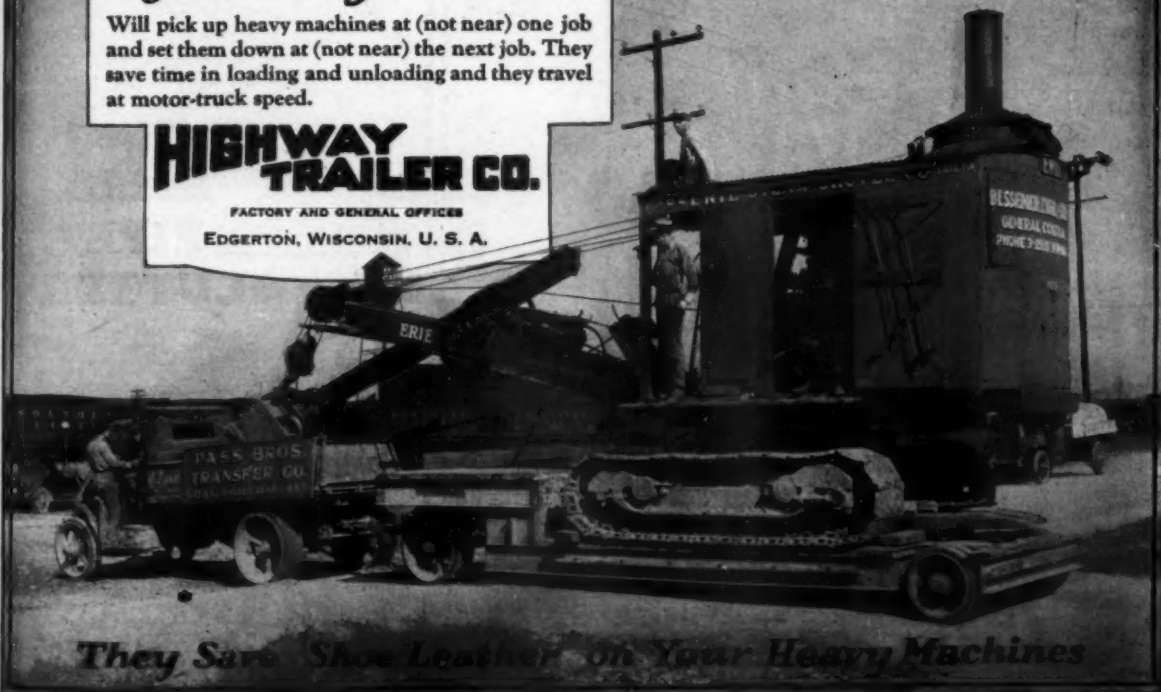
## BEAUMONT COPPER STEEL BINS

### Highway Machinery Trailers

Will pick up heavy machines at (not near) one job and set them down at (not near) the next job. They save time in loading and unloading and they travel at motor-truck speed.

**HIGHWAY  
TRAILER CO.**

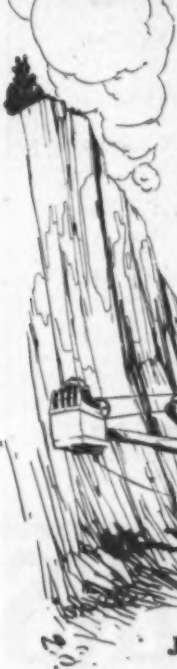
FACTORY AND GENERAL OFFICES  
EDGERTON, WISCONSIN, U. S. A.



*They Save "Shoe Leather" on Your Heavy Machines*



## DIXON'S WATERPROOF GRAPHITE GREASE



The graphite is the vital element, for it imparts to bearing surfaces a remarkable smoothness that relieves the grease of a very considerable portion of its task of keeping metallic bearing surfaces apart and takes upon itself the wear which would be borne by the metal. The flake graphite increases both the efficiency and durability of the lubricant.

On account of its great adhesiveness and tenacity, Dixon's Waterproof Grease will not be thrown from gears, etc., under ordinary conditions. It is not wasted by dripping and cannot be washed off by water. It not only lubricates but is a sure rust preventive as well.

These properties highly commend its use upon; wire ropes, chains, exposed gears, cranes, derricks, dredges, steam shovels, pump plungers, hoisting engines, or any other machinery requiring a heavy-duty or waterproof lubricant.

Write for Circular No. 148

Established 1827  
**JOSEPH DIXON CRUCIBLE CO.**  
Jersey City  New Jersey

## MUNDY HOISTING ENGINES

"Standard of the World"



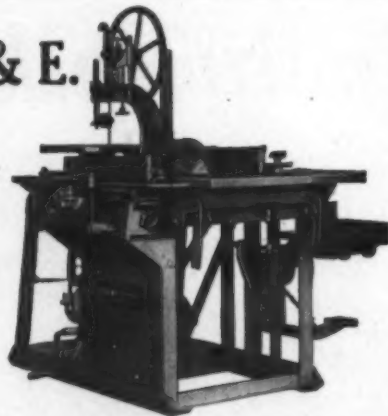
Steam, Gas and Electric Hoists, Dredge Hoists,  
Belt Hoists, Ship, Cargo and Dock  
Winches, Capstans, Cableways

Catalog Upon Request

**J. S. MUNDY HOISTING ENGINE CO.**  
722-40 Frelinghuysen Ave. Newark, N. J.

## C. H. & E.

has  
something  
new for  
you



**Home Builder's Saw Rig**  
and

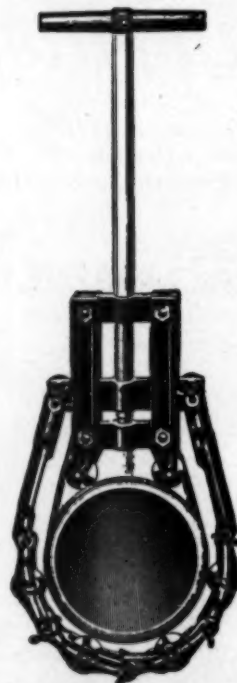
**No. 18-A Saw Rig**

With the new "TEXROPE"  
drive: all steel welded  
frame and steel table top.

Write now for additional information

MANUFACTURED BY  
**C. H. & E. MANUFACTURING CO., Inc.**  
250 Mineral Street Milwaukee, Wis.

## ONE CUT SAVES THE PRICE



YOU, too, may save  
the cost of this pipe  
cutter on one job, just  
as many other contrac-  
tors and water compan-  
ies have done.

**The  
ELLIS  
PIPE  
CUTTER**

with its six keen rotary  
cutting blades eats its  
way right through any  
pipe in double-quick  
time. Use No. 01 for  
all kinds of pipe 4 to  
8 inches in diameter, or  
No. 1 for pipe 4 to 12  
inches in diameter.

Write for circular

**ELLIS & FORD MFG. CO.**  
32 Piquette Ave. DETROIT, MICH.

## ATLAS Portable Belt CONVEYORS

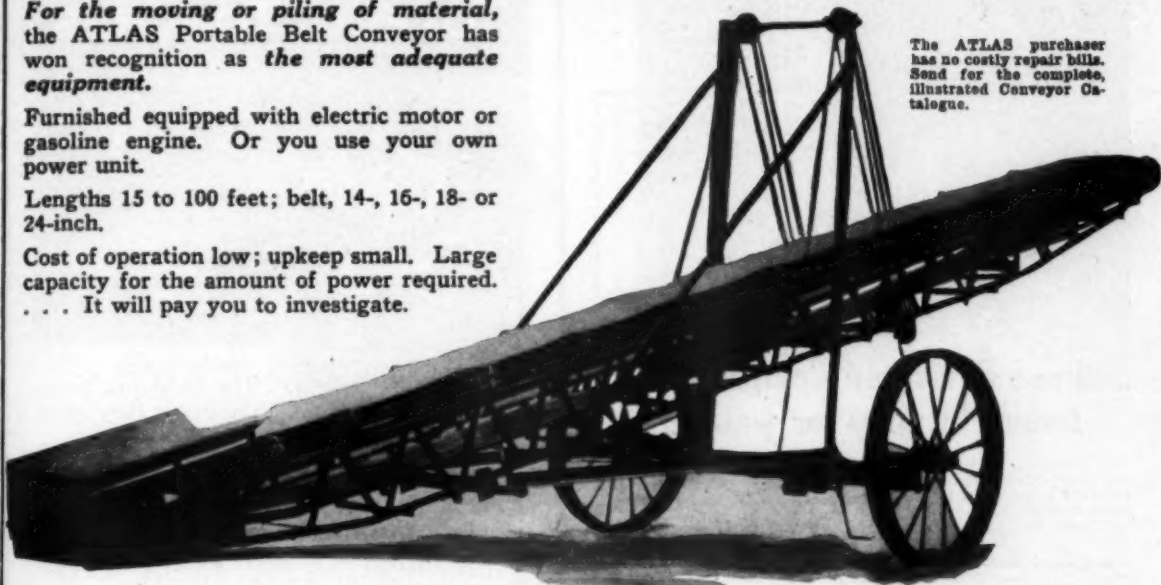
*For the moving or piling of material, the ATLAS Portable Belt Conveyor has won recognition as the most adequate equipment.*

Furnished equipped with electric motor or gasoline engine. Or you use your own power unit.

Lengths 15 to 100 feet; belt, 14-, 16-, 18- or 24-inch.

Cost of operation low; upkeep small. Large capacity for the amount of power required. . . . It will pay you to investigate.

The ATLAS purchaser has no costly repair bills. Send for the complete, illustrated Conveyor Catalogue.



### ATLAS ENGINEERING COMPANY

Box "N"  
Clintonville, Wisconsin

Manufacturers of Bucket Elevators—Loaders—Tractors, Etc.

Branch Office  
Milwaukee, Wisconsin



## EISEMANN

**The Foremost Magneto**

~ for Construction Equipment

The overwhelming choice of the builders of high quality equipment. Favored by contractors everywhere.

EISEMANN MAGNETO CORPORATION  
165 Broadway - New York

## A Densified Pennsylvania Oil

For Gears—Pressure Fittings—Ball and  
Roller Bearings—Grease Cups—Chains  
and Cables of

**TRACTORS—TRUCKS—SHOVELS—CRANES  
AND ALL HEAVY DUTY EQUIPMENT**

*Warehouse, Stocks Throughout the United States*

**D-A LUBRICANT COMPANY, Inc.**

INDIANAPOLIS,

INDIANA, U. S. A.





## Sullivan Drills and Compressors tunnel 13 miles for water

For Boston's new water supply—the West Construction Company is tunneling thirteen miles through granite, to tap the water shed of the Ware River.

Speed, day and night, is paramount. And SULLIVAN Drills, Sharpeners and Compressors were chosen for the work.

SULLIVAN Rotators sunk the shafts, and SULLIVAN Drifters are driving and enlarging the tunnel in 10 out

of 14 headings.

SULLIVAN All-Hammer Sharpeners and Furnaces supply steel at seven points. And 18, SULLIVAN Balanced Angle Compressors back-up the drills.

Send for the full story, and catalogs on Sullivan Tunneling Equipment.

SULLIVAN  
MACHINERY CO.  
814 Wrigley Bldg.  
CHICAGO

# SULLIVAN

## BAKER MANEY Self Loading Scrapers

The original self-loading scrapers continue to show their ability to move large quantities of dirt with two to three men. They dig, load, haul, dump and compact the dirt as a single outfit.

They are available in three sizes— $\frac{3}{4}$ -, 1- and  $1\frac{1}{2}$ -cubic yard capacities to suit your job or your tractors.

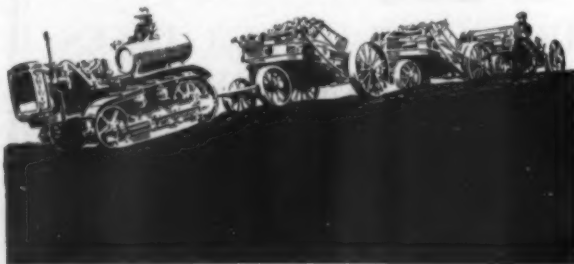
Write for these Baker Bulletins

- Bulletin No. 263—Baker Maney Scrapers ☐
- Bulletin No. 256—Baker Rotary Scrapers ☐
- Bulletin No. 270—Baker Road Maintainers ☐

### THE BAKER MANUFACTURING CO.

585 Stanford Ave.

Springfield, Ill.



## TOLEDO TORCHES



The harder it blows  
the better they burn

Toledo Torches have established a reputation . . . for dependable performance at low cost, that is unequalled by any other safety light made.

Sold by equipment dealers everywhere!

The  
Toledo Pressed Steel Company  
Toledo • Ohio

## HAVE YOU CHECKED Pages 3 to 30?

The Where to Purchase section in the front part of CONTRACTORS AND ENGINEERS MONTHLY is a very valuable aid to Contractors and Builders who are planning to purchase new equipment.

You may secure catalogs by writing direct to the manufacturers listed, or send a list to us and we will have them forwarded to you.



## LAKEWOOD PAVING EQUIPMENT



### A Smooth Surface

*It's the Tilted Screed that Does It!*

That troweling action, whereby pressure is applied to the "heel" of the Lakewood Screed Board, insures a smooth, even road surface.

There is nothing complicated or mysterious about it. The Lakewood Screed operates just the same as you would use a hand trowel. The front edge of the screed board is tilted slightly. As the machine moves forward the tilt of the screed board compresses the concrete, at the same time striking off at just the proper level. The natural result is a greatly improved surfacing action.

*There are many other exclusive advantages in this improved Screed, explained in detail in our Bulletin 47-M*

EXPORT OFFICES: 30 Church St., New York City • CABLE ADDRESS: Brooklyn  
**LAKEWOOD**  
 The Lakewood Engineering Co., CLEVELAND • O.

## Built to Stand the Gaff

**The**

## "GROUNDHOG"

REVOLVING TRACTOR SCRAPER

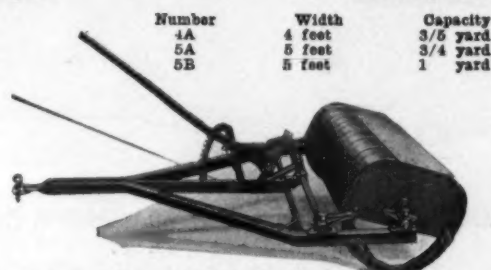
A stout, two-fisted, hard-hitting outfit that does the work where others fail. Saves time, effort and money. Loads and spreads or dumps continuously under forward draft—no stopping—no time lost. Depth of cut under instant control. Adjustable to all conditions.

*Write for Information*

**THE RODERICK LEAN COMPANY**

Dept. 9

Mansfield, Ohio



A long lever regulates depth of cut. Bites as deep as desired and stops loading instantly. No stalling, no over-loading. A simple and positive control for loading, dumping and spreading.

## Pelican



### DRAWING INKS

black and white and 18 brilliant shades  
*Send for color chart "A"*

**Pelican Works—Gunther Wagner, Inc.**  
 34 East 23rd Street, New York

## EVERYWHERE



40 ft. 6 in. Portable Belt Type Conveyor equipped with shaker screen separating three sizes of materials and delivering one size into truck

## CHICAGO AUTOMATICS

Are cutting, loading and unloading costs for thousands of contractors.

*Write for Descriptive Bulletins*

**CHICAGO AUTOMATIC CONVEYOR CO.**

*Originators of the Portable Conveyor*

1853 South 55th Ave. Cicero, Illinois

*Manufacturers of*

Portable and Stationary Belt and Bucket Type Conveyors and Loaders—Shaker Screens

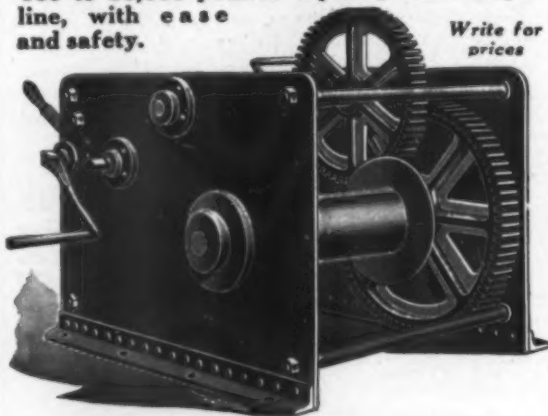
*Agents in all principal cities*

TRADE MARK  
**DOBBIE**  
ESTABLISHED 1862

## WINCHES

A Dobbie Winch for every purpose. From 100 to 50,000 pounds capacity on a single line, with ease and safety.

Write for prices



**DOBBIE FOUNDRY & MACHINE CO.**  
Niagara Falls, N. Y.

Complete Stock Carried at Niagara Falls  
Also G. S. Green Co., 74 Warren Street  
New York City, N. Y.

*Buhl Buhl Buhl*  
*Buhl Buhl Buhl*  
*Buhl Buhl Buhl*  
*Buhl Buhl Buhl*

**Buhl**  
AIR COMPRESSORS

*Buhl Buhl Buhl*  
*Buhl Buhl Buhl*  
*Buhl Buhl Buhl*

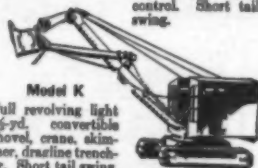
**The Buhl Company**  
Old Colony Bldg.  
Chicago

*The*  
**BAY-CITY**  
*family of fast workers*



**Model R**

A 26-ton, heavy-duty, full revolving 34-yd. shovel. Operates shovel, clamshell, dragline, trench box, skimmer or crane. Electric starter, E-E clutch control. Short tail swing.



**Model K**

Full revolving light 14-yd. convertible shovel, crane, skimmer, dragline trencher. Short tail swing. Perfect stability—no rocking on center pin. Weight, 13 tons.



**Tractor Shovel**

Recognized leader in its field. Operates shovel, trench box, clamshell, dragline, backfiller or crane boom. Weighs 10 tons.

**BAY CITY SHOVELS, Inc., Bay City, Mich.**

**HOTEL**  
**Majestic**

25-29 QUINCY ST.

**Chicago.**

**200 Rooms**  
**Fireproof**

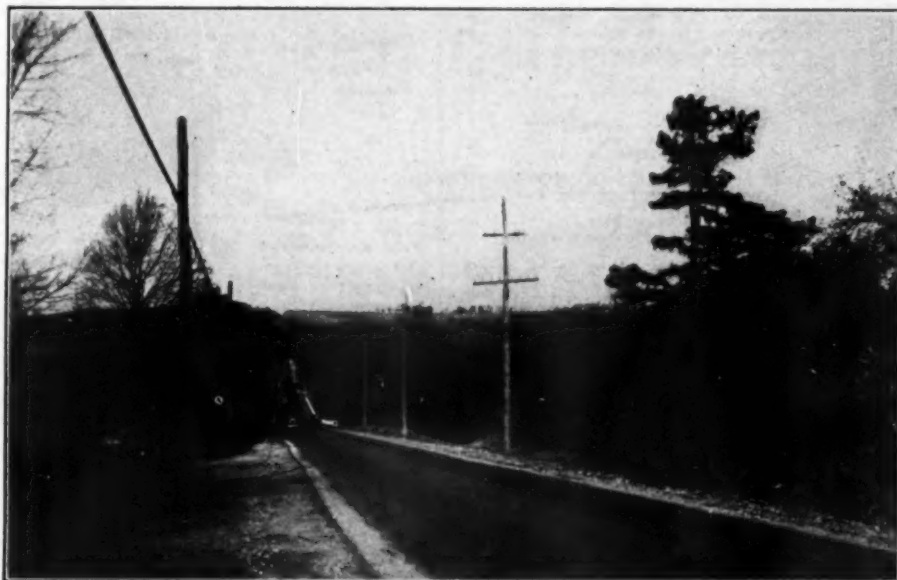
**17 Floors**  
**Center of All Activity**

**\$2.00 Per Day**  
**and up**

**Phone or Write,**  
**C. Hermans & Sons**  
**Managers and Operators**

**HARRISON-3200**





Massachusetts State Highway, Boston to Newburyport. Asphalt Macadam construction with SOCONY Asphalt Binder in 1923. This view taken in October, 1928, after carrying heavy traffic for five years without repairs or resurfacing.

## Standard Asphalt Products

Standard Asphalt Binder A  
(Socony Brand)

*for surface treatment*

Standard Asphalt Binder B  
(Socony Brand)

*for penetration work*

Standard Asphalt Binder C  
(Socony Brand)

*for the mixing method*

Standard Asphalt Joint Fillers  
(Socony Brand)

*for brick or black pavements*

Standard Cold Patch Asphalt  
(Socony Brand)

*for repairing all types  
of Bituminous road surfaces*

Standard Refined Asphalt  
(Socony Brand)

*for sheet asphalt paving*

Standard Paving Flux,  
Bridge Asphalt and  
Preserving Oils  
(Socony Brand)

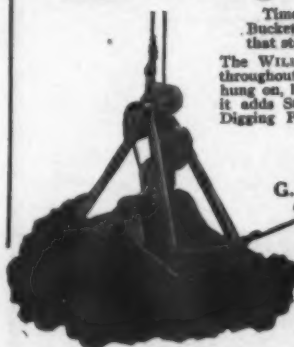
*Specifications and all other particulars  
furnished on request*



STANDARD OIL COMPANY OF NEW YORK, 26 BROADWAY



## Where weight counts most



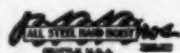
Time and again you see WILLIAMS Buckets dig in and stand up in work that stops other buckets, because—  
The WILLIAMS is more ruggedly constructed throughout—with the weight not simply hung on, but built right into the bucket where it adds Strength and Durability as well as Digging Power.

Write for our Bulletin "C" describing the new line of WILLIAMS Champion Buckets

**G. H. WILLIAMS COMPANY**  
609 Haybarger Lane, Erie, Pa.

Branch Offices:  
New York, Pittsburgh, Chicago

**WILLIAMS**  
FAST-DIGGING BUCKETS



"The Strongest Geared Power for Its Weight in the World"

Capacity  
**5 Tons**  
Straight  
Line

—  
**POSITIVE  
INTERNAL  
BRAKE**

Weight  
**110-lbs.**

Size  
**16x17x13-in.**  
high

Two Speeds  
**4 to 1  
24 to 1**

Price \$80 F. O. B. Warehouse Points,  
Chicago, Brooklyn, New Orleans, Houston.

Dealers in Principal Cities

**BEEBE BROS.**

3219 First Ave., So. Seattle, Wash.

Write for descriptive  
circular with users' en-  
dorsements and name  
of nearest dealer.

## LOWER Your Costs—WIN More Jobs



"American" portable woodwork-  
ing machinery is helping hun-  
dreds of contractors to cut labor  
costs and lower their bids. Ask  
for details on this Band Saw and  
our Saw Rigs and Hoists.

Agents wanted for open territory

**AMERICAN**

SAW MILL MACHINERY COMPANY

Makers of  
Woodworking and Saw Mill Machinery  
171 Main St. Hackensack, N. J.

Fig. 1056

## HONHORST TAR HEATERS

"Built for service"

ALL STYLES

Portable and Stationary  
25 to 200 gallons

See our page in Street Construction Section,  
Municipal Index, for the Kettle you need.

Write for Pamphlet No. 15 on  
the New Oil Burning Heater

**THE JOS. HONHORST CO.**

1016 W. 6TH ST.

CINCINNATI, O.



## HOISTING BLOCKS

\* STAR BRAND \*

Are Always Reliable

Made for

Every Condition of Service

Sold by

Leading Supply Houses

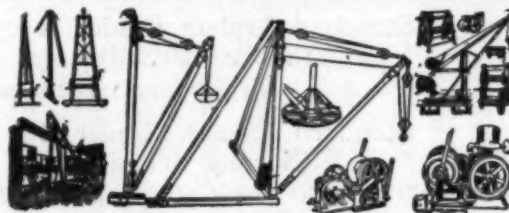
Let us help you with your problems

**BOSTON & LOCKPORT BLOCK CO.**

NEW YORK

BOSTON

CHICAGO



We have a complete line  
of Derricks and Winches

**SASGEN DERRICK CO.**

3101 Grand Ave.

Chicago, Ill.

## Dependable Power

in sizes ranging  
in HP. from  
3 to 180

**Le Roi Company**  
Milwaukee

**LE ROI ENGINES**

for dependable power!

## UNIVERSAL CAST IRON PIPE

**THE CENTRAL FOUNDRY COMPANY**

420 Lexington Ave., New York City

CHICAGO  
332 S. Michigan Ave.

DALLAS  
Praetorian Bldg.

BIRMINGHAM  
Corner Bldg.

SAN FRANCISCO  
Rialto Bldg.

# Mile after mile— [ of unwrinkled ] concrete, through the heart of TENNESSEE



*A section of the concrete Dayton Pike, through Southern Tennessee. Carey Elastite Expansion Joint, installed transversely at frequent intervals, keeps the road smooth and prolongs its life.*

**A** revelation to motorists, the inviting expanse of white concrete that ribbons through Hamilton County, in Southern Tennessee. One of the finest, smoothest roads in the South, because "shock absorbers" are bonded right into the concrete.

Carey Elastite Expansion Joint! It compresses readily under pressure—protects concrete against seasonal strains and prolongs its life. The water-tight, frost-tight sandwich joint, extensively used and recommended by leading engineers and contractors in every State in the Union. Manufactured by a

company who has been in business over fifty years—pioneer makers of expansion joints. Write for particulars about modern installation methods.

**Carey Elastite**  
EXPANSION JOINT

**THE PHILIP CAREY COMPANY, Lockland, CINCINNATI, OHIO**

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

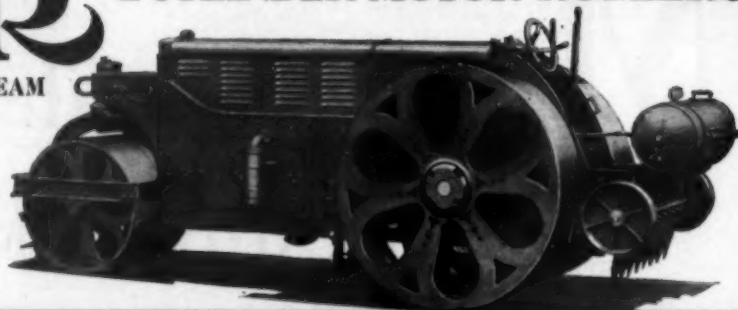
# HUBER 4 CYLINDER MOTOR ROLLERS

POWERFUL AND DEPENDABLE AS STEAM  
EASY TO HANDLE  
SINGLE LEVER CONTROL

MADE IN FOUR SIZES

5-7-10-12  
tons

SEND FOR  
HUBER ROLLER CATALOG



330 E. CENTER ST.

THE HUBER MANUFACTURING CO.

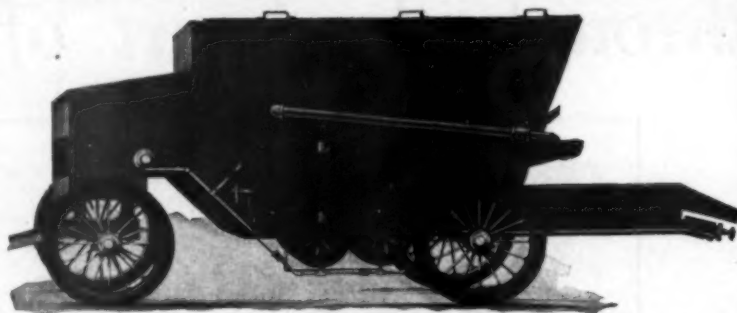
MARION, OHIO

## A Moderate-Priced Street Repair Unit

Every city can now afford to do its own street repairing. The new Model H-1 Chausse hot patching unit has marked improvements over other hand mixing outfits. Rubber Tires, Oil Burners, Material Bins. First batch in only 45 minutes.

Write for descriptive circular

**Chausse Oil Burner Company**



Elkhart,  
Indiana

OTHER PRODUCTS—Oil Burning Surface Heaters,  
Tool Heaters, Tar Kettles, Concrete Mixer Heaters,  
Kerosene Torches. Write for illustrated catalogs.

## HE CHANGED HIS ADDRESS TWICE IN ONE YEAR

A contractor on our subscription list recently sent in his second change of address during the year, with a letter of apology for the extra work he was making for our Subscription Department. We want everyone of our readers to know that no apologies are called for, even if you send us a change of address every month. We want you to have the **CONTRACTORS AND ENGINEERS MONTHLY** at your new address just as quickly as you change from the former location, and the coupon below is included for your convenience in notifying us.

Contractors and Engineers Monthly,  
443 Fourth Avenue, New York City.

Kindly change my address on your subscription list from

Name .....

Address .....

— TO —

Name .....

Street .....

City and State .....

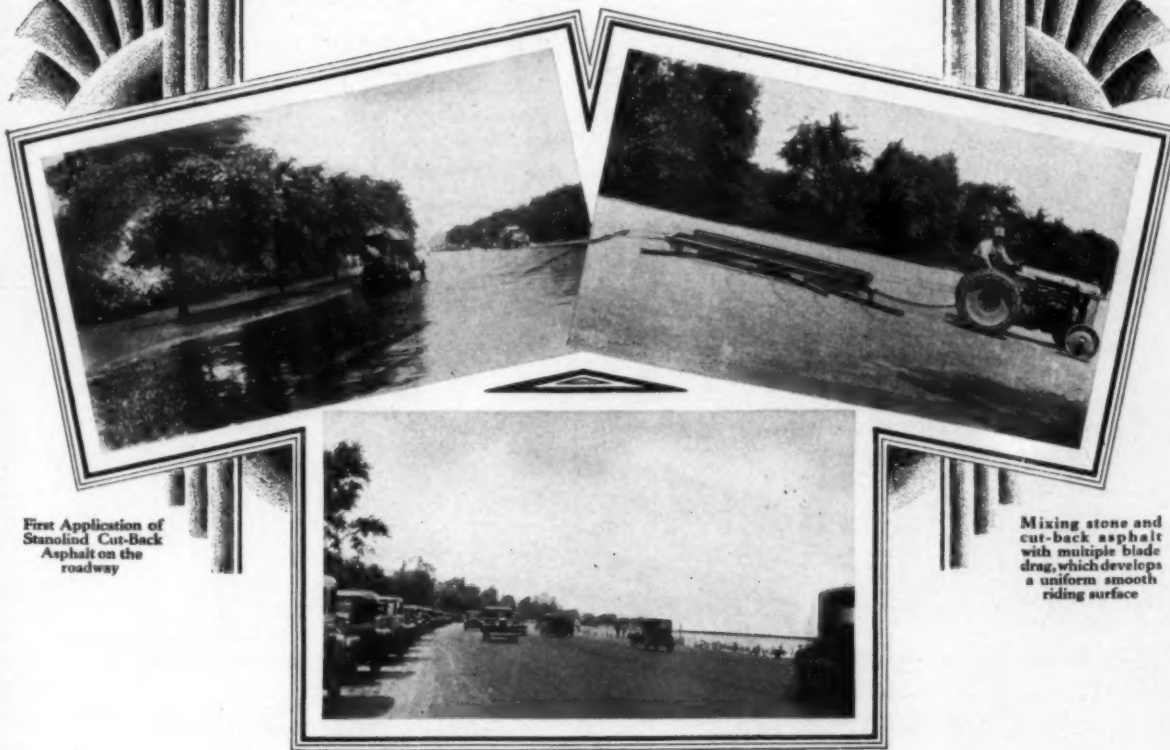


# Traffic Conditions Demanded the Best, So They Used Stanolind Cut-Back Asphalt

LAKE SHORE DRIVE through Jackson Park is one of the heaviest traveled boulevards in Chicago.

Recently a 1/2-inch resurfacing was accomplished, using two applications of Stanolind Cut-Back Asphalt and approximately fifty pounds of aggregate per square yard. The result is a smooth attractive roadway, durable and easy to ride on.

This method of resurfacing is economical and expedient.



First Application of Stanolind Cut-Back Asphalt on the roadway

Mixing stone and cut-back asphalt with multiple blade drag, which develops a uniform smooth riding surface

Completed Roadway

## STANDARD OIL COMPANY (Indiana)

General Offices: 910 South Michigan Avenue

CHICAGO, ILLINOIS

ILLINOIS  
Chicago  
Decatur  
Joliet  
Peoria  
Quincy

INDIANA  
Evansville  
Indianapolis  
South Bend  
KANSAS  
Wichita

IOWA  
Davenport  
Des Moines  
Mason City  
Sioux City

MICHIGAN  
Detroit  
Grand Rapids  
Saginaw  
S. DAKOTA  
Huron

WISCONSIN  
La Crosse  
Milwaukee  
Green Bay

MINNESOTA  
Duluth  
Mankato  
Minneapolis

MISSOURI  
Kansas City  
St. Joseph  
St. Louis

N. DAKOTA  
Fargo  
Minot

220

# HUMDINGER PUMPS

Open Discharge Type



## Popular with contractors—

is this HUMDINGER Open Discharge Pump for suction lifts up to twenty-five feet, where it is unnecessary to carry water away from the pump discharge.

For total heads up to fifty feet, where it is necessary or more convenient to carry water away from or above the pump, see our circular describing our HUMDINGER Diaphragm Force Pump.

Non-clogging rubber-ball valves, enclosed transmission gears and bronze bearings are standard in all HUMDINGER Diaphragm Force Pump.

Write for booklet.

**RALPH B. CARTER CO.**  
HACKENSACK, N. J.

# The ANDERSON SAFETY HOOK

A New and Improved

The ANDERSON hook is absolutely safe under all conditions and is an essential part of hoisting equipment wherever hooks are required.

This hook cannot accidentally become unfastened when attached to load nor will it, at any time, foul or snare projections or obstructions, whether carrying the load or running free.

Note the re-inforcing, flared lips at the bottom of hook which provide a sure and quick method of attaching, thereby forming an interlocking link. A half-turn of the hand releases the attachment and the hook automatically snaps back to closed position.

The ANDERSON Safety Hook is made in varied designs and sizes to meet all requirements. It is being used in many important industries and is highly indorsed by engineers.

Sole Owners of the U. S. Patent Rights

**THE PUBLIC WORKS  
EQUIPMENT CO., Inc.**

1776 Broadway,  
New York,  
N. Y.



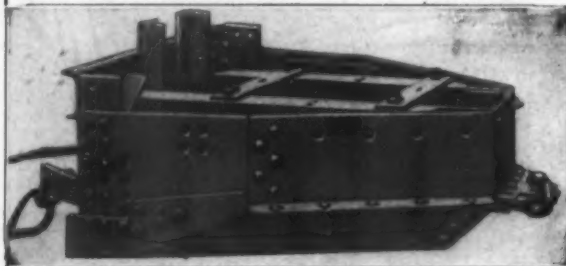
## POWER DRAG SCRAPERS

Write for our catalog on all types of  
Gravel and Excavating Equipment

**L. P. GREEN**

564 Monadnock Bldg.,

Chicago, Ill.



## CONTRACTORS AND BUILDERS

If you haven't checked over pages 108 to 114, please do so without further delay, for you will find there a convenient list of items describing the most recent changes and improvements on all types of machinery and equipment used throughout the United States.

**PUNCHES, DIES  
AND  
RIVET SETS**

**CHIPPING CHISELS  
AND  
SPECIAL TOOLS**

are shown in our new Catalog No. 9

**THE CLEVELAND CO.**  
**STEEL TOOL CO.**

Punches, Dies, Chisels, Rivet Sets  
660 E. 82<sup>nd</sup> St. Cleveland, O.

